

**ARMY
AIR FORCE**

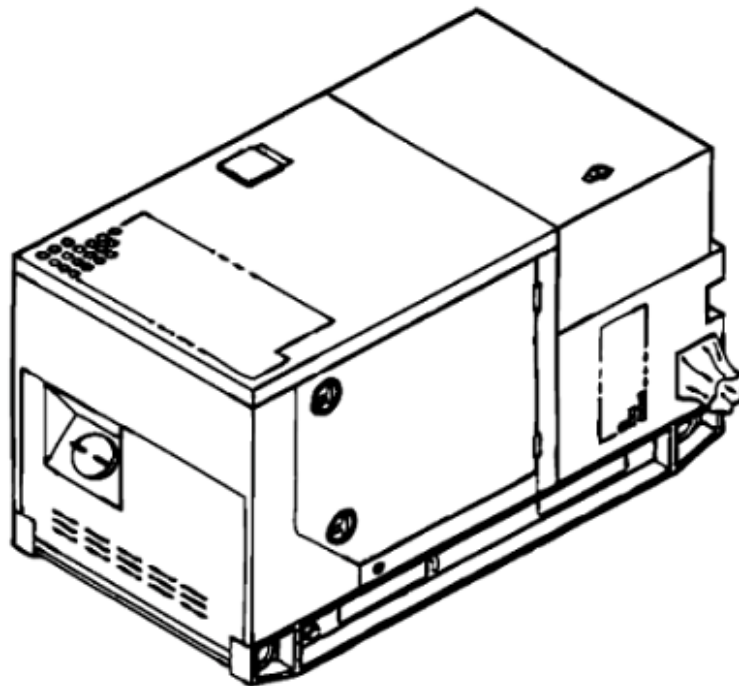
***TM 9-6115-641-24
TO 35C2-3-456-12**

TECHNICAL MANUAL

**FIELD AND SUSTAINMENT MAINTENANCE MANUAL
FOR**

**GENERATOR SET, SKID MOUNTED,
TACTICAL QUIET, 5 KW, 60 HZ
MEP-802A (NSN 6115-01-274-7387) (EIC VG2)**

**GENERATOR SET, SKID MOUNTED,
TACTICAL QUIET, 5 KW, 400 HZ
MEP-812A (NSN 6115-01-274-7391) (EIC VN2)**



*TM 9-6115-641-24 dated 15 April 2012 superseded TM 9-6115-641-24 dated 1 September 1993, including all changes.

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**HEADQUARTERS, DEPARTMENTS
OF THE ARMY AND AIR FORCE
15 APRIL 2012**

WARNING SUMMARY

FIRST AID

For First Aid information, refer to FM 4-25.11.



5

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1

DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2

IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3

IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4

SEND FOR HELP AS SOON AS POSSIBLE

5

AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING AND CAUTION STATEMENTS

Warning and Caution statements have been strategically placed throughout this text prior to operating procedures, practices, or conditions considered essential to the protection of personnel (WARNING) or equipment and property (CAUTION).

A WARNING or CAUTION will apply each time the related step is repeated. Prior to starting any task the WARNINGS or CAUTIONS included in the text for that task must be reviewed and understood. Refer to the materials list at the beginning of the appropriate manual section for materials used during maintenance of this equipment. This warning summary contains the WARNINGS included in the manual.

WARNING SUMMARY – CONTINUED

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING SUMMARY – CONTINUED

WARNING

Prior to making any connections for parallel operation, ensure that there is no input to the load and that the generator sets are shutdown. Failure to comply with this warning can cause injury or death to personnel.

WARNING

If it is necessary to move a generator set which has been operating in parallel with another generator set, shutdown remaining generator set connected to the load, prior to removing load and ground cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Power is available when the main contactor is open. Avoid accidental contact. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage power is available when the main contactor is closed. Avoid accidental contact with live components. Ensure load cables are properly connected and the load cable door is shut before closing main contactor. Ensure load is turned off before closing main contactor. Ensure that soldiers working with/on loads connected to the generator set are aware that main contactor is about to be closed before closing main contactor. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect the batteries before performing maintenance on the slave receptacle. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING SUMMARY – CONTINUED

WARNING

Hot engine surfaces from the engine and generator circuitry are possible sources of ignition. When hot refueling with DF-1, DF-2, JP5 or JP8, avoid fuel splash and fuel spill. Do not smoke or use open flame when performing refueling. Remember PMCS is still required. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

In extreme cold weather, skin can stick to metal. Avoid contacting metal items with bare skin in extreme cold weather. Failure to comply with this warning can cause injury to personnel.

WARNING

Operating the generator set exposes personnel to a high noise level. Hearing protection must be worn when operating or working near the generator set when the generator set is running. Failure to comply with this warning can cause hearing damage to personnel.

WARNING

Exhaust discharge contains deadly gases including carbon monoxide. DO NOT operate generator set in enclosed areas unless exhaust discharge is properly vented outside. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Hot exhaust gases can ignite flammable materials. Allow room for safe discharge of hot gases and sparks. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Top housing panels and exhaust system can get very hot. When performing DURING PMCS, wear gloves and additional protective clothing as required. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING SUMMARY – CONTINUED

WARNING

Exercise extreme caution when performing DURING PMCS checks inside engine compartment. Avoid contact with moving or hot engine parts. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, Winterization Kit heater has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow heater to cool before performing maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Battery acid can cause burns to unprotected skin. Wear safety goggles and chemical gloves and avoid acid splash while working on batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING SUMMARY – CONTINUED

WARNING

Do not operate generator set while servicing radiator. Failure to comply with this warning can cause injury to personnel and damage to the equipment.

WARNING

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply with this warning can cause injury to personnel.

WARNING

Oil filter base and housing springs are under tension and can act as projectiles when being removed. Use eye protection when removing springs. Failure to comply with this warning can cause injury to personnel.

WARNING

The high pressure oil system operates at high temperature and pressure. Contact with hot oil can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Wear heat resistant gloves and avoid contacting hot surfaces. Do not allow hot oil or components to contact skin or hands. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

If not shielded, hot exhaust pipe can ignite flammable wall materials. Failure to comply with this warning can cause injury or death to personnel.

WARNING

An unwrapped exhaust pipe can cause injury if touched. Failure to comply with this warning can cause injury to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

WARNING

Avoid breathing fumes generated by soldering. Eye protection is required. Good general ventilation is normally adequate. Failure to comply with this warning can cause injury to personnel.

WARNING SUMMARY – CONTINUED

WARNING

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

WARNING

High pressure steam can blow particles or chemicals into eyes, can cause severe burns, and creates hazardous noise levels. Wear protective eye, skin, and hearing protection when using high pressure steam. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Rated capacity of overhead hoist should be at least 1,500 pounds (680 kg). Do not use a hoist with less capacity. Failure to comply with this warning can cause injury or death to personnel, and damage to equipment.

WARNING

Keep hands and feet from underside of engine and generator while using lifting device to remove them from the skid base. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Support components when removing attaching hardware or component may fall. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cleaning compound is toxic. Avoid prolonged breathing of vapors. Use only in a well-ventilated area. Failure to comply with this warning can cause injury to personnel.

WARNING SUMMARY – CONTINUED

WARNING

Conversion coating material is toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with conversion coating material. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Hot metal surfaces can cause burns to skin. Wear protective gloves and eye protection when applying heat to generator housing. Failure to comply with this warning can cause injury to personnel.

WARNING

Use protective gloves when handling heated rectifier hub. Failure to comply with this warning can cause injury to personnel.

WARNING

Do not use the engine starter to turn the flywheel. Failure to comply with this warning can cause injury to personnel.

WARNING

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Muffler and flex hoses can get very hot. Allow them to cool before touching them. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Oil fumes or oil can ignite above 380 °F (193 °C). Use a thermometer and do not exceed 360 °F (182 °C). Do not allow a flame or heating element to be in direct contact with oil. Heat oil in a well ventilated area. Plan a safe handling procedure to avoid burns. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Engine exhaust fumes contain deadly poisonous gases.

Severe exposure can cause death or permanent brain damage.

Exhaust gases are most dangerous in places with poor airflow. Best defense against exhaust gas poisoning is very good airflow.

WARNING SUMMARY – CONTINUED

To protect yourself and your partners, always obey the following rules:

- DO NOT run engine indoors unless you have VERY GOOD AIRFLOW.
- DO NOT idle engine for a long time unless there is VERY GOOD AIRFLOW.
- Be alert at all times. Check for smell of exhaust fumes.
- REMEMBER: Best defense against exhaust gas poisoning is VERY GOOD AIRFLOW.
- Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get ALL PERSONNEL clear of exhaust area. Make sure they have lots of fresh air. KEEP THEM WARM, CALM, AND INACTIVE. GET MEDICAL HELP. If anyone stops breathing, give artificial respiration. See FM 4-25.11 for first aid.

LIST OF EFFECTIVE PAGES / WORK PACKAGES

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Date of issue for the original manual is:

Original

15 April 2012

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 32 AND TOTAL
NUMBER OF WORK PACKAGES IS 150, CONSISTING OF THE FOLLOWING:**

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND AIR FORCE
Washington, D.C., 15 APRIL 2012

TECHNICAL MANUAL
FIELD AND SUSTAINMENT MAINTENANCE MANUAL
FOR

GENERATOR SET, SKID MOUNTED, TACTICAL QUIET, 5 KW, 60 HZ
MEP-802A (NSN 6115-01-274-7387) (EIC VG2)

GENERATOR SET, SKID MOUNTED, TACTICAL QUIET, 5 KW, 400 HZ
MEP-812A (NSN 6115-01-274-7391) (EIC VN2)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Reports, as applicable by the requiring Service, should be submitted as follows:

- (a) (A) Army - Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual, directly to: Commander, U.S. Army Communications-Electronics Command, 6001 Combat Drive, ATTN: AMSEL-LCL-ECM, Aberdeen Proving Ground, MD 21005-1846. You may also send in your recommended changes via electronic mail or by fax. Our fax number is 443-861-5521, DSN 848-5521. Our e-mail address is MONM-AMSELLEOPUBSCHG@conus.army.mil. Our online web address for entering and submitting DA Form 2028s is <http://edm.apg.army.mil/pubs/2028.html>.
- (b) (F) Air Force - By Air Force AFTO Form 22 (Technical Manual (TM) Change Recommendation and Reply) in accordance with TO 00-5-1.

A reply will be furnished to you.

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HOW TO USE THIS MANUAL

This manual contains field and sustainment instructions for the Skid Mounted Tactical Quiet (TQ) Generator Sets.

NOTE

Throughout the family of manuals, directional orientation in relation to the equipment is described from the point of view of the operator facing the operator's controls looking out over the equipment. From this perspective, the end of the equipment containing the operator's controls will be referred to as the rear.

This manual provides operating procedures, troubleshooting, maintenance, and supporting information required to operate and maintain the Skid Mounted Tactical Quiet (TQ) Generator Sets. Listed below are some of the features included in this TM to help locate and use the provided information.

WORK PACKAGES

This TM has been organized using the WP format. Each chapter contains a series of WPs rather than sections and paragraphs. Each WP is designed to stand alone as a complete information module; if the user keeps the section(s) of this TM in a loose-leaf binder, the user will be able to remove just the WP needed to complete a specific task. Here are some WP features of which the user should be aware.

Each WP is numbered using a four-digit number beginning with WP 0001. WPs are numbered sequentially throughout the TM (ex. WP 0016. WP 0020. etc.). The Table of Contents lists each chapter and WP title as well as all figures and tables contained within each. Figures and tables are numbered sequentially for each WP.

The WP number is located at the top right of each page. It is also located at the bottom of the page with the WP page number included (0001-1 would be page 1 of the General Information WP (WP 0001, General Information)).

Each WP starts on a right-hand page. This is done so the user can remove a single WP from the paper TM if needed for a task. Blank pages are assigned a number, but it appears on the preceding or following page. For example, if page 0001-10 of a WP is blank, page 0001-9 will have the number 0001-9/10 blank; or if page 0001-1 of a WP is blank, page 0001-2 will have the number 0001-1 blank/2.

Each WP containing step-by-step maintenance or troubleshooting procedures will end with the words END OF TASK, and each WP ends with the statement END OF WORK PACKAGE. Think of each WP as a small, stand-alone TM.

Typographical conventions are as follows:

[Unload] indicates a soft key or a switch.

[Previous] + [Next] indicates two simultaneous key presses. [+] [-] indicates two sequential key presses.

References to equipment Data and Description Plates are printed as they appear on the equipment whenever possible.

Warnings, Cautions and Notes Definitions

Warnings, cautions, notes, chapter titles, and paragraph headings are printed in bold type. Icons related to warnings are shown directly above the warning text.

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout this publication. Warning, cautions and notes provide supplemental information. Personnel must understand and apply these warnings, cautions and notes during many phases of operation and maintenance to ensure personnel safety and health and the protection of property. Portions of this information may be repeated in certain chapters of this publication for emphasis.

WARNING

A warning identifies a clear danger for injury or death to the person doing that procedure.

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CAUTION

A caution identifies risk of damage to the equipment.

NOTE

A note is used to highlight essential procedures, conditions, or statements or convey important instructional data to the user.

CHAPTER OVERVIEW

Chapter 1 - General Information, Equipment Description and Theory of Operation

Chapter 1 provides an introduction to the Skid Mounted Tactical Quiet (TQ) Generator Sets. It is divided into three work packages, as follows:

General Information. This work package provides general information about this manual and the related forms and records. Instructions are provided for making equipment improvement recommendations. Coverage includes a reference to the TM that contains instructions on destruction of materiel to prevent enemy use. Also, a list of abbreviations and acronyms is provided. Also, a nomenclature cross-reference list is provided as well as a list of abbreviations and acronyms.

Equipment Description and Data. This work package describes capabilities, characteristics, and features. It provides basic equipment data and shows the locations of major components. Descriptions of the major components are also provided.

Theory of Operation. This work package provides functional descriptions of the equipment.

Chapter 2 - Field Troubleshooting Procedures

Chapter 2 covers troubleshooting procedures of the Skid Mounted Tactical Quiet (TQ) Generator Sets to be performed by the field level maintenance. The chapter is divided as follows:

Field Troubleshooting Index. This work package provides a troubleshooting introduction and malfunction/symptom index to direct you to the appropriate troubleshooting procedure at the field maintenance level.

Field Troubleshooting Procedures. This work package covers troubleshooting procedures and corrective actions that are to be performed at the field maintenance level. It also provides references to the applicable technical manuals.

Chapter 3 - Field Maintenance Instructions

Chapter 3 covers maintenance procedures for the Skid Mounted Tactical Quiet (TQ) Generator Sets that must be performed at field level. Its purpose is to provide you with the information that you need to keep the equipment in good operating condition. The chapter is divided as follows:

Service Upon Receipt. This work package contains instructions for inspecting and servicing the equipment when it is received. It includes instructions for unpacking the equipment when it is received. The instructions also include unpacking and stowing the basic issue items that accompany the Skid Mounted Tactical Quiet (TQ) Generator Sets. Also included are instructions on positioning the equipment for operation and connecting an external fuel source.

Field Preventive Maintenance Checks and Services (PMCS) Introduction. This work package provides a detailed explanation of each table entry in the PMCS table along with applicable warnings, cautions and notes prior to starting on the PMCS procedures.

Field PMCS, Including Lubrication Instructions. This work package contains detailed instructions that the operator must perform before, during, and after preventive maintenance checks and services. Coverage includes all field PMCS for the equipment. This work package also lists the applicable references that contain lubrication instructions for your equipment.

HOW TO USE THIS MANUAL – CONTINUED

Field Maintenance Procedures. These work packages refer the operator to the preventive maintenance checks and services required by WP (insert field PMCS WP).

Winterization Kit. WP 0109 through WP 0130 provides field and sustainment level information on the operation, troubleshooting and maintenance of the winterization kit designed to be mounted in generator sets where extreme cold temperatures are anticipated. The chapter is divided as follows:

General Information and Equipment Description and Data. These work packages describe and illustrate the components of the winterization kit to ensure proper operation of the kit when installed on all generator sets.

Troubleshooting Procedures. This work package provides troubleshooting procedures and corrective actions that are to be performed by the operator.

Service Upon Receipt. This work package provides information concerning the service upon receipt required by field for the winterization kit already installed on the generator set.

PMCS Introduction and PMCS Including Lubrication Instruction. These work packages contain detailed instructions that must be performed before, during, and after preventive maintenance checks and services of the winterization kit. Lubrication instructions provide the information that no lubrication is required on the winterization kit.

Maintenance Procedures. This work packages provide instructions for installing, maintaining and removing the winterization kit from the 5kW Generator Set.

Preparation for Storage or Shipment. This work package provides information on short-term, intermediate-term, and long-term storage.

Illustrated List of Manufactured Items. These work packages provide instructions for making the items authorized to be manufactured or fabricated at the field maintenance level.

Torque Limits. This work package lists standard torque values for bolts and screws used in maintaining the equipment.

Chapter 4 - Sustainment Maintenance Instructions

Chapter 4 provides instructions covering the Skid Mounted Tactical Quiet (TQ) Generator Sets maintenance that must be performed at sustainment level. The chapter is divided as follows:

Sustainment Maintenance Procedures. These work packages list the applicable references that cover sustainment maintenance of the equipment.

Chapter 5 - Field and Sustainment Supporting Information

The chapter is divided as follows:

References. This work package lists all publications referenced in the various chapters of the technical manual. The listing includes the title and document number of each publication.

Maintenance Allocation Chart (MAC) Introduction. This work package explains what is covered in the maintenance allocation chart.

Maintenance Allocation Chart (MAC). This work package has three sections, as follows:

Maintenance Allocation Chart (MAC). Table 1 contains a tabular listing that assigns maintenance functions to specific maintenance levels. It lists the work time needed to perform each maintenance function at the assigned level. It also contains a column that has entries keyed to the tools and equipment listed in Table 2. Another column has entries keyed to the remarks in Table 3.

Tool and Test Equipment Requirements. Table 2 contains complete identification information for the items referenced in the tools and equipment column of Table 1.

Remarks. Table 3 provides additional information for each entry in the remarks column of Table 2.

Expendable and Durable Items List. This work package lists expendable/durable supplies and materials needed to operate and maintain your equipment. The work package contains two sections, as follows:

Introduction. This section explains the entries in Tables 1.

Expendable and Durable Items List. The list indicates the maintenance level that needs each item and identifies the items by National Stock Number (NSN), description, and unit of measure.

HOW TO USE THIS MANUAL – CONTINUED

Rear Matter

Alphabetical Index. An alphabetical index at the back of this technical manual provides a listing of subjects covered, cross-referenced to the applicable work packages.

HOW TO FIX AN EQUIPMENT MALFUNCTION

Determining the Cause

Finding the cause of a malfunction, troubleshooting, is the first step in fixing your equipment and returning it to operation. Follow these simple steps to determine the root of the problem:

1. Turn to the Table of Contents in this manual.
2. Locate "Troubleshooting" under the chapter that covers your level of maintenance. Turn to the page indicated.
3. For field troubleshooting, follow the instructions in the references listed in Chapter 2.
4. For troubleshooting at the sustainment level, find the malfunction listing in Chapter 4. Follow the instructions provided as indicated by the symptom index.

Preparing for a Task

Be sure that you understand the entire maintenance procedure before beginning any maintenance task. Make sure that all parts, materials, and tools are handy. Read all steps before beginning.

Prepare to do the task as follows:

1. Carefully read the entire task before starting. It tells you what you will need and what you have to know to start the task. **DO NOT START THE TASK UNTIL:**
 - a. You know what is needed
 - b. You have everything you need
 - c. You understand what to do
2. If parts are listed, they can be drawn from technical supply. Before you start the task, check to make sure you can get the needed parts. National stock numbers (NSNs) and part numbers for Skid Mounted Tactical Quiet (TQ) Generator Sets parts are listed in the Repair Parts and Special Tools List (RPSTL).
3. If expendable/durable supplies or materials are needed, get them before starting the task. Refer to WP (insert explist WP) for the correct nomenclature and NSN.

How to Do the Task

Before starting, read the entire task. Be sure that you understand the entire procedure before you begin the task.

As you read, remember the following:

1. PAY ATTENTION TO WARNINGS, CAUTIONS, AND NOTES.
2. Use the List of Abbreviations/Acronyms if you do not understand the special abbreviations or unusual terms used in this manual.
3. The following are standard maintenance practices. Instructions about these practices are usually not included in task steps. When standard maintenance practices do not apply, the task steps will tell you.
 - a. Tag electrical wiring before disconnecting it.
 - b. Discard used preformed packing, retainers, gaskets, cotter pins, lockwashers, and similar items. Install new parts to replace the discarded items.
 - c. Coat packing before installation, in accordance with the task instructions.
 - d. Disassembly procedures describe the disassembly needed for total authorized repair. You may not need to disassemble an item as far as described in the task. Follow the disassembly steps only as far as needed to repair/replace worn or damaged parts.
 - e. Clean the assembly, subassembly, or part before inspecting it.
 - f. Before installing components having mating surfaces, inspect the mating surfaces to make sure they are in serviceable condition.
 - g. Hold the bolt (or screw) head with a wrench (or screwdriver) while tightening or loosening a nut on the bolt (or screw).
 - h. Torque to the special torque cited when the task instructions include the words "torque to." Use standard torques at all other times.

HOW TO USE THIS MANUAL – CONTINUED

- i. When a cotter pin is required, align the cotter pin holes within the allowable torque range.
- j. Inspect for foreign objects after performing maintenance.

CHAPTER 1

FIELD AND SUSTAINMENT GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

FIELD AND SUSTAINMENT MAINTENANCE**GENERAL INFORMATION**

SCOPE**Type of Manual.**

This manual contains Field and Sustainment maintenance instructions for the 5 kW 60 Hz and 400 Hz Tactical Quiet (TQ) Generator Sets (Figure 1), herein referred to as generator sets. Included are descriptions of major components and their functions in relation to other components.

Purpose of Equipment

The generator set provides tactical quiet AC power. The generator set is easily transported, operated, and maintained.

LIMITED APPLICABILITY

Some portions of this publication are not applicable to all services. These portions are prefixed to indicate the service(s) to which they pertain: (A) for Army, (F) for Air Force, and (N) for Navy.

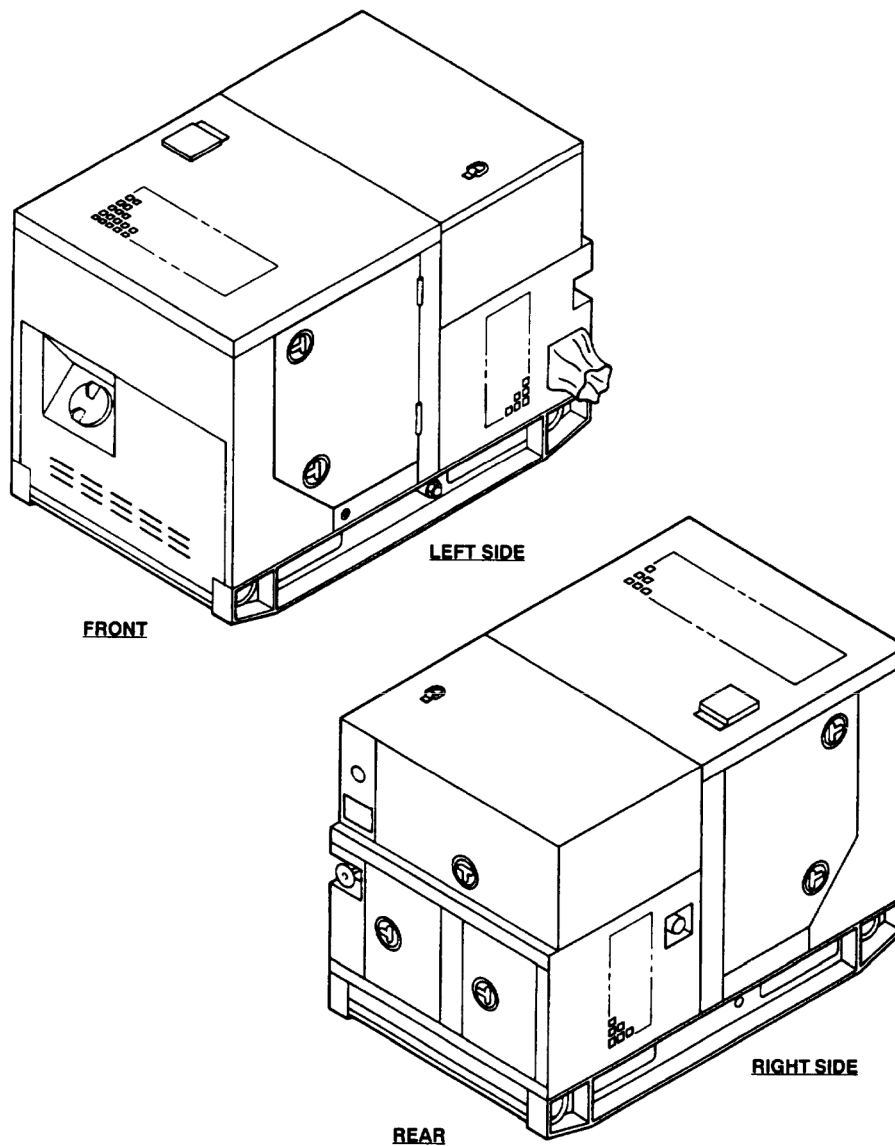
SCOPE – CONTINUED

Figure 1. 5 kW 60 Hz and 400 Hz Tactical Quiet Generator Sets.

MAINTENANCE FORMS, RECORDS, AND REPORTS

(Army) Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

(Air Force) Maintenance forms and records used by Air Force personnel are prescribed in AFI 21-101 and the applicable TO 00-20 Series Technical Orders.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

(1) (*Army*) If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. If you have Internet access, the easiest and fastest way to report problems or suggestions is to follow the instructions and links below:

If you have a user's account you can submit the PQDR for ALL CECOM (B16) Warranty, EIR and PQDRs (including those B16 Aviation related) through the Navy's Web Product Quality Deficiency Reporting (PQDR) site, <http://www.nslcptsmh.csd.disa.mil/webpqdr/webpqdr.htm>. If you do not, either go to EZPQDR, <http://www.nslcptsmh.csd.disa.mil/webpqdr/files/ezpqdr.htm>, and input your PQDR there or establish a new account. New accounts can be established at the following address: <http://www.nslcptsmh.csd.disa.mil/access-forms/uarform.htm>.

CECOM (B16) aviation PQDRs will not go to AMCOMs Joint Deficiency Reporting System (JDRS). If AMCOM should get a CECOM aviation PQDR they will re-direct it to the CECOM PQDR Team.

Use the PQDR for Warranties, EIRs and PQDRs. There is a block on the PQDR that can be clicked if it is a Warranty. The originator can still put in the description that they want this investigated as an EIR and then enter what the issue is.

You may also submit your SF 368 (Product Quality Deficiency Report) via email (MONM-AMSELLEODCSCFO@CONUS.ARMY.MIL), facsimile (443-861-6356) or regular mail (call 443-861-6310 for the current mailing address).

We will send you a reply.

(2) (*Air Force*) Air Force personnel are encouraged to submit EIR's in accordance with AFR 900-4.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) User's Manual.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

(A) Destruction of the generator set to prevent enemy use shall be in accordance with TM 750-244-3.

(F) Air Force users shall refer to their service directives to obtain procedures for destruction of material to prevent enemy use.

PREPARATION FOR STORAGE OR SHIPMENT

Preservation

Preserve generator sets in accordance with levels A/A, A/B, C/B or C/C of PPP-G-2919.

PREPARATION FOR STORAGE OR SHIPMENT – CONTINUED

Preserve generator set cooling systems in accordance with method II of PPP-G-2919 or the antifreeze and water procedure of ATPD 2232.

Packing

Pack generator sets in accordance with levels A/A, A/B, C/B or C/C of PPP-G-2919.

Marking

Mark for shipment or storage in accordance with MIL-STD-129P(4).

Use of Corrosion-preventive Compounds, Moisture Barriers, and Desiccant Materials

(A) Refer to Corrosion and Corrosion Prevention/Metal, MIL-HDBK-729 NOT 1.

Storage

(A) For storage information, refer to TB 740-97-2. (F) Refer to TO 38-1-5.

NOMENCLATURE CROSS-REFERENCE LIST**Model Number****Equipment Name**

MEP-802A

Generator Set, Skid Mounted, Tactical Quiet 5 kW 60 Hz

MEP-812A

Generator Set, Skid Mounted, Tactical Quiet 5 kW 400 Hz

LIST OF ABBREVIATIONS/ACRONYMS**Abbreviation****Definition**

°C

Degrees Celsius

°F

Degrees Fahrenheit

AAL

Additional Authorization List

AMP

Ampere

BOI

Basis Of Issue

CAGE

Commercial And Government Entity

CAGEC

Commercial And Government Entity Code

cm

Centimeter

CPC

Corrosion Prevention And Control

CTA

Common Table of Allowance

DMWR

Depot Maintenance Work Requirement

DOD

Department Of Defense

EIR

Equipment Improvement Recommendation

FGC

Functional Group Code

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

ft•lb	Foot Pound
gal	Gallon
Hz	Hertz
in•lb	Inch Pound
JTA	Joint Table of Allowances
kg	Kilogram
kPa	Kilopascals
kVa	Kilovolt-ampere
kW	Kilowatt
kW	Kilowatt
L	Liter
m	Meter (Metric Measure)
mA	Milliamperes
mS	Millisecond
MTOE	Modified Table of Organization and Equipment
N	Newton
N•m	Newton•Meter
NATO	North Atlantic Treaty Organization
NBC	Nuclear Biological Chemical
NHA	Next Higher Assembly
NIIN	National Item Identification Number
NSN	National Stock Number
oz	Ounce
P/N	Part Number
pa	Pascal
PMCS	Preventive Maintenance Checks And Services
psi	Pounds per Square Inch
qt	Quart
SMR	Source, Maintenance, And Recoverability
TAMMS	The Army Maintenance Management System
UOC	Usable On Code
V	Volts

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

VAC	Volts Alternating Current
VDC	Volts Direct Current

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this technical manual (*TM 9-6115-641-24*). If quality of material requirements are not stated in this technical manual (*TM 9-6115-641-24*), the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

SUPPORTING INFORMATION FOR REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT**Maintenance Repair Parts**

Repair parts and equipment are listed and illustrated in the repair parts and special tools list manual TM 9-6115-641-24P.

Tools and Equipment

There are no special tools or support equipment required to perform any level of maintenance on the generator set. A list of recommended tools and support equipment required to maintain the generator set is contained in WP 0154, Table 1.

Fabrication of Tools and Equipment

No requirement exists for fabrication of tools and equipment for maintenance of the generator set.

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE**EQUIPMENT DESCRIPTION AND DATA**

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**GENERAL**

The generator sets, models MEP-802A and MEP-812A (WP 0001, Figure 1), are fully enclosed, self-contained, skid-mounted, portable units. They are equipped with controls, instruments, and accessories necessary for operation as single units or in parallel with another unit of the same class and mode. The generator sets consist of a diesel engine, brushless generator, excitation system, speed-governing system, fuel system, 24 VDC starting system, control system, and fault system.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS**NOTE**

All locations (index numbers) referenced are given facing the control box side (rear) of the generator set.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

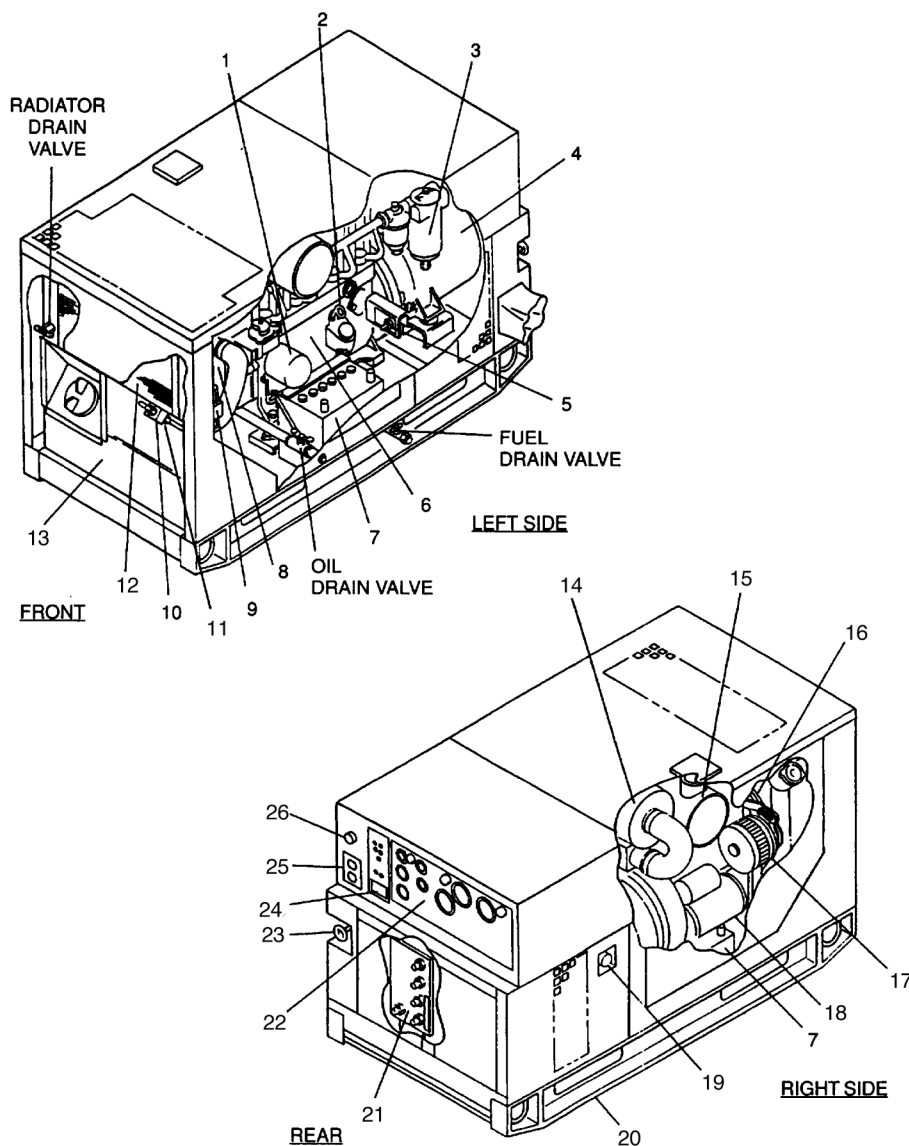


Figure 1. Generator Set Components.

Oil Filter (1)

The oil filter is located in the engine compartment on the left side. The filter removes impurities from the engine lube oil.

Dipstick (2)

The dipstick is located on the left side of the engine compartment. The dipstick shows the lube oil level in the engine crankcase.

Fuel Filter/Water Separator (3)

The fuel filter/water separator is located on the rear of the engine compartment on the left side. The element removes impurities and water from the diesel fuel.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED**AC Generator (4)**

The AC generator is a single bearing, drip-proof, synchronous, brushless, three phase, air-cooled generator. The generator is coupled directly to the rear of the diesel engine.

DEAD CRANK Switch (5)

The DEAD CRANK switch is located in the engine compartment on the left side. The switch allows the engine to be turned over without starting for maintenance purposes.

Engine (6)

The generator is powered by a two cylinder, four cycle, fuel injected, naturally-aspirated, liquid-cooled diesel engine which occupies the front half of the generator set. The engine is also equipped with a fuel filter/water separator, oil filter, and an air cleaner assembly. Protection devices automatically stop the engine during conditions of high coolant temperature, low oil pressure, no fuel, and overvoltage.

Batteries (7)

Two batteries are required, one on each side of the generator set. The batteries are electrolyte serviceable, lead acid, 12 volt type, connected in series. After starting, the generator set is capable of operating with batteries removed. A fuse and a diode, located behind the control panel assembly, protects the generator set if the batteries are incorrectly connected.

Water Pump (8)

The water pump is located in the engine compartment on the front of the engine. The pump circulates the engine coolant through the engine block and the radiator.

Fuel Transfer Pump (9)

The fuel transfer pump is located in the engine compartment on the front left side. The pump is electrically operated and transfers fuel from the fuel tank to the engine through the fuel filter/water separator.

Auxiliary Fuel Pump (10)

The auxiliary fuel pump is located behind the front housing panel on the left side. The pump is electrically operated and transfers fuel from an auxiliary fuel source to the fuel tank.

Auxiliary Fuel Filter (11)

The auxiliary fuel filter is located behind the front housing panel on the left side. The filter removes impurities from the diesel fuel when using the auxiliary fuel supply.

Radiator (12)

The radiator is located at the front of the generator set. It acts as a heat exchanger for the engine coolant.

Fuel Tank (13)

The 5 gal (18.9 L) fuel tank is located in the front of the generator set below the engine and between the skid base side members. The fuel tank is a fuel reservoir and has sufficient capacity to enable the generator set to operate for at least 8 hours without refueling.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED**Air Cleaner Assembly (14)**

The air cleaner assembly is located on the right side behind the engine. It consists of a dry-type, disposable air filter element made of paper and a canister. The air cleaner assembly features a dust collector which traps large dust particles. The air cleaner assembly has a restriction indicator (visible by opening left engine access door) which will indicate red when the air filter element requires servicing.

Muffler (15)

The muffler and exhaust tubing are connected to the exhaust manifold on the engine. The exhaust exits from the top of the generator set housing. Gases are exhausted upward.

Fan Belt (16)

The fan belt is located in the engine compartment on the front of the engine. The belt drives the fan, water pump, and the battery charging alternator.

Battery Charging Alternator (17)

The battery charging alternator is located on the right side of the engine. It is capable of maintaining the batteries in a state of full charge in addition to providing the required 24 VDC control power.

Starter (18)

The starter is located on the right side of the engine. The electric starter mechanically engages the engine fly-wheel in order to start the diesel engine.

NATO SLAVE RECEPTACLE (19)

The NATO SLAVE RECEPTACLE is located on the right side (rear) of the generator set. It is used for slave starting.

Skid Base (20)

The skid base supports the generator set. It has fork lift access openings and cross members for short distance movement and lifting rings located at each corner of the skid base. The skid base has provisions in the bottom for installation of the generator set on a trailer.

Load Output Terminal Board (21)

The load output terminal board is located on the bottom left side (rear) of the generator set. Four output terminals are located on the board. They are marked L1, L2, L3, and L0. A fifth terminal, marked GND, is located next to the output terminals and serves as equipment ground for the generator set. A removable, solid copper bar is connected between the L0 and GND terminals.

Control Panel (22)

The generator set control panel assembly is located at the rear of the generator set and contains controls and instruments for operating the engine and the generator.

FREQUENCY ADJUST Control (23)

The FREQUENCY ADJUST control is located at the rear left side of generator set. It is used to adjust the generator frequency output.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED**Malfunction Indicator Panel (24)**

The malfunction indicator panel is located to the left of the control panel assembly. It indicates malfunctions of the generator set components.

CONVENIENCE RECEPTACLE (25)

The CONVENIENCE RECEPTACLE is a 120 VAC receptacle used to operate small plug in type equipment.

Diagnostic Connector (26)

The diagnostic connector is a multi-pin plug that is wired to specific points in the generator set electrical system to enable monitoring and troubleshooting of the generator set operation at a single location.

DIFFERENCES BETWEEN MODELS

The differences between models of the generator sets covered in this manual are as follows:

Model MEP-802A is equipped with a 60 Hz generator and 60 Hz frequency meter.

Model MEP-812A is equipped with a 400 Hz generator and 400 Hz frequency meter.

EQUIPMENT DATA

For generator set tabulated data, refer to Table 1.

Table 1. Tabulated Data.

ITEM		CHARACTERISTIC
1.	Generator Set:	
	Model Number:	
	5 kW 60 Hz	MEP-802A
	5 kW 400 Hz	MEP-812A
	National Stock Number (NSN):	
	MEP-802A	6115-01-274-7387
	MEP-812A	6115-01-274-7391
	Overall Length:	
	MEP-802A	50.6 in (128.6 cm)
	MEP-812A	50.6 in (128.6 cm)
	Overall Width:	
	MEP-802A	32 in (81.28 cm)
	MEP-812A	32 in (81.28 cm)
	Overall Height:	
	MEP-802A	37 in (93.98 cm)
	MEP-812A	37 in (93.98 cm)
	Dry Weight (Less Basic Issue Items):	
	MEP-802A	800 lb (362.8 kg)

EQUIPMENT DATA – CONTINUED

Table 1. Tabulated Data. – Continued

ITEM		CHARACTERISTIC
	MEP-812A	825 lb (374.2 kg)
	Wet Weight:	
	MEP-802A	868 lb (393.7 kg)
	MEP-812A	893 lb (1022.6 kg)
2.	Engine:	
	Manufacturer	Onan
	Model	DN2M-1
	Type	Two cylinder, four cycle, naturally aspirated diesel
	Displacement	57 cu in (0.9 L)
	Altitude Degradation, 4,000 ft (1,220m) to 8,000 ft (2,440m)	3.5% per 1,000 ft (305m)
	Firing Order	1, 2
	Cold Weather Starting Aid System Use	40 to -25 °F (4 to -32 °C)
	Valve Tappet Clearance Adjustment	None Required
3.	Cooling System:	
	Type	Pressurized radiator and pump
	Capacity	6.2 qts (5.9 L)
	Normal Operating Temperature	170-200 °F (77-93 °C)
	Temperature Indicating System Voltage Rating	24 VDC
4.	Lubricating System:	
	Type	Full flow, circulating pressure forced lubrication
	Oil Pump Type	Positive displacement gear Trochoid
	Normal Operating Pressure	25-60 psi (172-414 kPa)
	Oil Filter Type	Full flow, spin-on, replaceable element
	Capacity	3.2 qts (3.0 L)
	Pressure Indicating System Voltage Rating	24 VDC
5.	Fuel System:	
	Type of Fuel	DF-1, DF-2, DF-A, JP4, JP5, JP8
	Fuel Tank Capacity	5 gal (18.9 L)
	Fuel Consumption Rate:	
	MEP-802A	0.55 gal (2.1 L) per hour
	MEP-812A	0.61 gal (2.3 L) per hour
	Auxiliary Fuel Pump:	
	Voltage Rating	24 VDC
	Delivery Pressure	5.0-6.5 psi (34.5-65.5 kPa) (max)

EQUIPMENT DATA – CONTINUED

Table 1. Tabulated Data. – Continued

ITEM		CHARACTERISTIC
6.	Fuel Level Switch:	
	Type	Float
	Current	0.6 amps (min) at 24 VDC
	Engine Starting System:	
	Batteries	Two 12 volt, connected in series
	Starter:	
	Manufacturer	Onan
	Model	191-1550
	Voltage Rating	24 VDC
	Drive Type	Gear reduction
	Battery Charging Alternator:	
	Manufacturer	Prestolite
	Model	8EM3005CA
	Amperage Rating	18 amps at 24 VDC
	Protective Fuse	30 amps
7.	AC Generator:	
	Manufacturer	Onan
	Type	Rotating field, synchronous
	Load Capacity	5 kW
	Current Ratings:	
	120/240 Volt Connection	26 amps
	120/208 Volt Connection	17 amps
	120 Volt Connection	52 amps
	Power Factor	0.8
	Cooling	Fan cooled
8.	Drive Type	Direct coupling
	Duty Classification	Continuous
	Protection Devices:	
	Low Oil Pressure Switch:	
	Trip Pressure	15±3 psi (103.4±20.7 kPa)
	Voltage Rating	24 VDC
	Current Rating	7 amps resistive; 4 amps inductive
	Coolant High Temperature Switch:	
	Trip Temperature	225±5 °F (107±3 °C)
	Voltage Rating	0-28 VDC
	Current Rating	7 amps resistive; 4 amps inductive

EQUIPMENT DATA – CONTINUED**Table 1. Tabulated Data. – Continued**

ITEM	CHARACTERISTIC
Overvoltage Relay:	
Trip Point Condition	153±3 VAC for no less than 200 milliseconds (120 VAC coil winding)
Trip Point	No more than 1.25 seconds after trip conditions exist

For generator set performance characteristics, refer to Table 2.

Table 2. Performance Characteristics.

ITEM	MEP-802A/MEP-812A
1. Voltage:	
a. Voltage Waveform Deviation Factor:	
Single Phase	6% (max)
Three Phase	5% (max)
Single Voltage Harmonics:	
Single Phase	3% (max)
Three Phase	2% (max)
b. Voltage Unbalance	5% of rated voltage (max)
c. Phase Balance Voltage	1% of rated voltage (max)
d. Voltage Modulation	2.5% (max)
e. Voltage Regulation	3% (max)
f. Short-term Stability (30 seconds)	±2% of rated voltage
g. Long-term Stability (4 hours)	±4% of rated voltage
h. Voltage Drift (60 °F (16 °C) in 8 hour period)	2% (max)
i. Dip and Rise for Rated Load	20% of rated voltage (max)
Recovery Time	3 seconds
j. Dip for Low Power Factor Load	35% of no-load voltage (max)
Recovery Time	5 seconds
	95% of no-load voltage
k. Adjustment Range VAC	
120V Connection	114-126V
120/240V Connection	228-252V
120/208V Connection	205-220V
2. Frequency:	
a. Regulation	3% of rated frequency
b. Short-term Steady-state Stability (30 seconds)	2% of rated frequency
c. Long-term Steady-state Stability (4 hours)	3% of rated frequency

EQUIPMENT DATA – CONTINUED**Table 2. Performance Characteristics. – Continued**

ITEM		MEP-802A/MEP-812A
d.	Frequency Drift (60 °F (16 °C) in 8 hour period)	2% (max)
e.	Undershoot with Application of Load	3% of rated frequency (max)
	Recovery Time	3 seconds
f.	Overshoot with Application of Load	4% of rated frequency (max)
	Recovery Time	3 seconds
g.	Adjustment Range	±3%

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE

THEORY OF OPERATION

INTRODUCTION

This work package contains functional descriptions of the generator set, explains how the controls and indicators interact with the systems, and provides the location and description of major components.

PRINCIPLES OF OPERATION

General

The generator is a four-pole, revolving field, brushless exciter, reconnectable model of drip-proof construction. The generator rotor is mounted on a center rotor shaft which is supported in the rear by a single ball bearing mounted in the end bell. The forward end of the rotor shaft is connected to the engine by means of a flywheel and drive plate. The brushless exciter stator mounts to the end bell while the exciter rotor and rotating rectifier assembly mount on the generator rotor shaft.

The generator has four wires extending from the stator housing in addition to the AC output leads (Figure 1). Lead F1+ and F2- are from the exciter field winding and are connected to the output terminals of the voltage regulator. Leads Q1 and Q2 are connected to the stator windings and provide reference voltage and input power to the AC voltage regulator.

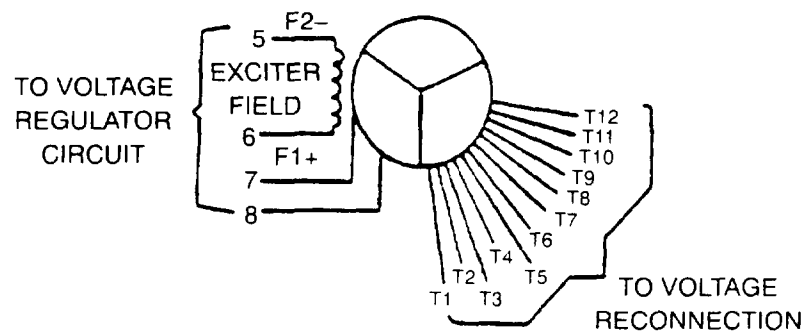


Figure 1. Generator Schematic.

Operation

Operation of the generator involves the stator, AC voltage regulator, exciter rotor, exciter stator, a full wave bridge rectifier, and the generator rotor (Figure 2). The generator set field flash circuit, activated during the engine starting process, begins the voltage build-up process. Single-phase AC voltage, taken from one of the stator windings, is fed to the AC voltage regulator as a reference for maintaining the generator output voltage. AC voltage is converted to DC in the AC voltage regulator and fed into the exciter rotor windings. The exciter stator produces three-phase AC voltage that is converted to DC by the rotating rectifier assembly. The resultant DC voltage excites the generator rotor winding to produce the stator output voltage for the AC load.

PRINCIPLES OF OPERATION – CONTINUED

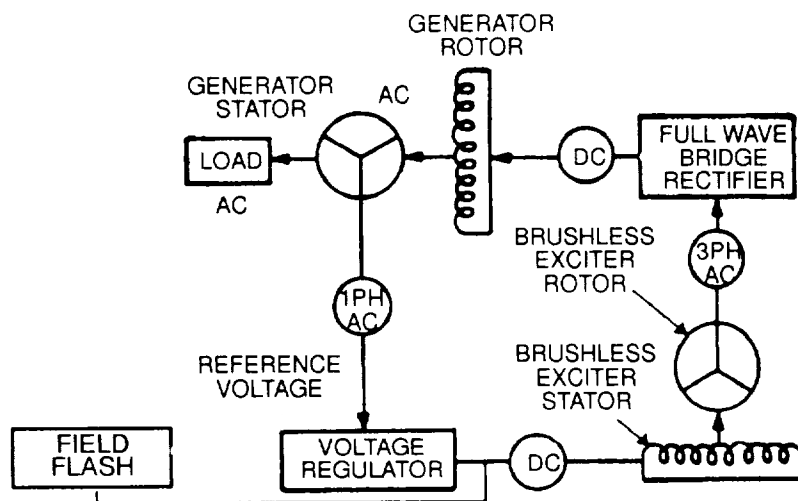


Figure 2. Excitation Block Diagram.

Fault System

The fault system (Figure 3) protects the generator set and any connected load against the potential faults described below and provides an indication of any incurred fault. The following summary of the fault system will assist in understanding the operation of the other generator set systems. Additional details relating to specific protection devices are also provided in the descriptions of the respective systems.

The fault system consists of the malfunction indicator, low fuel level float switch, fuel float switch module, fuel level relay, low oil pressure switch, oil pressure relay, coolant high temperature switch, overvoltage relay, overload/short circuit relay, engine fault relay, and BATTLE SHORT switch. In addition to the fault indicator lamps, the malfunction indicator includes the PUSH TEST & RESET LAMPS switch which, when depressed, illuminates all the lamps and resets any fault indication.

Activation of any one of the following protection devices will cause three events to occur. The AC circuit interrupter relay will open; the generator set engine will be shut down; and a fault indicator lamp will be illuminated to show which malfunction occurred.

Coolant High Temperature Switch. This device will activate when the engine coolant leaving the engine exceeds 225 ± 5 °F (104 ± 2 °C).

Low Oil Pressure Switch. This device activates when the engine lubrication oil pressure falls below 15 ± 3 psi (103.4 ± 20.7 kPa).

Low Fuel Level Float Switch. This device will activate when the fuel level falls to a point at which the operating time of the set at rated load is 4 minutes.

Overvoltage Relay. This device will activate when the 120 volt generator coil winding has risen to and remained at any value greater than 153 ± 3 volts.

The fuel float switch module is a device that prevents inadvertent engine shutdown by providing a 1 second delay after actuation of the low fuel level float switch.

Electrical protection devices will cause two events to occur. The AC circuit interrupter relay will open, and a fault indicator lamp will illuminate to indicate which fault occurred.

Short Circuit Relay. This device will activate when the set output current in any phase exceeds 425 percent of the rated value.

Overload Relay. This device will operate when the load current in any phase exceeds 110 percent of the rated value.

PRINCIPLES OF OPERATION – CONTINUED

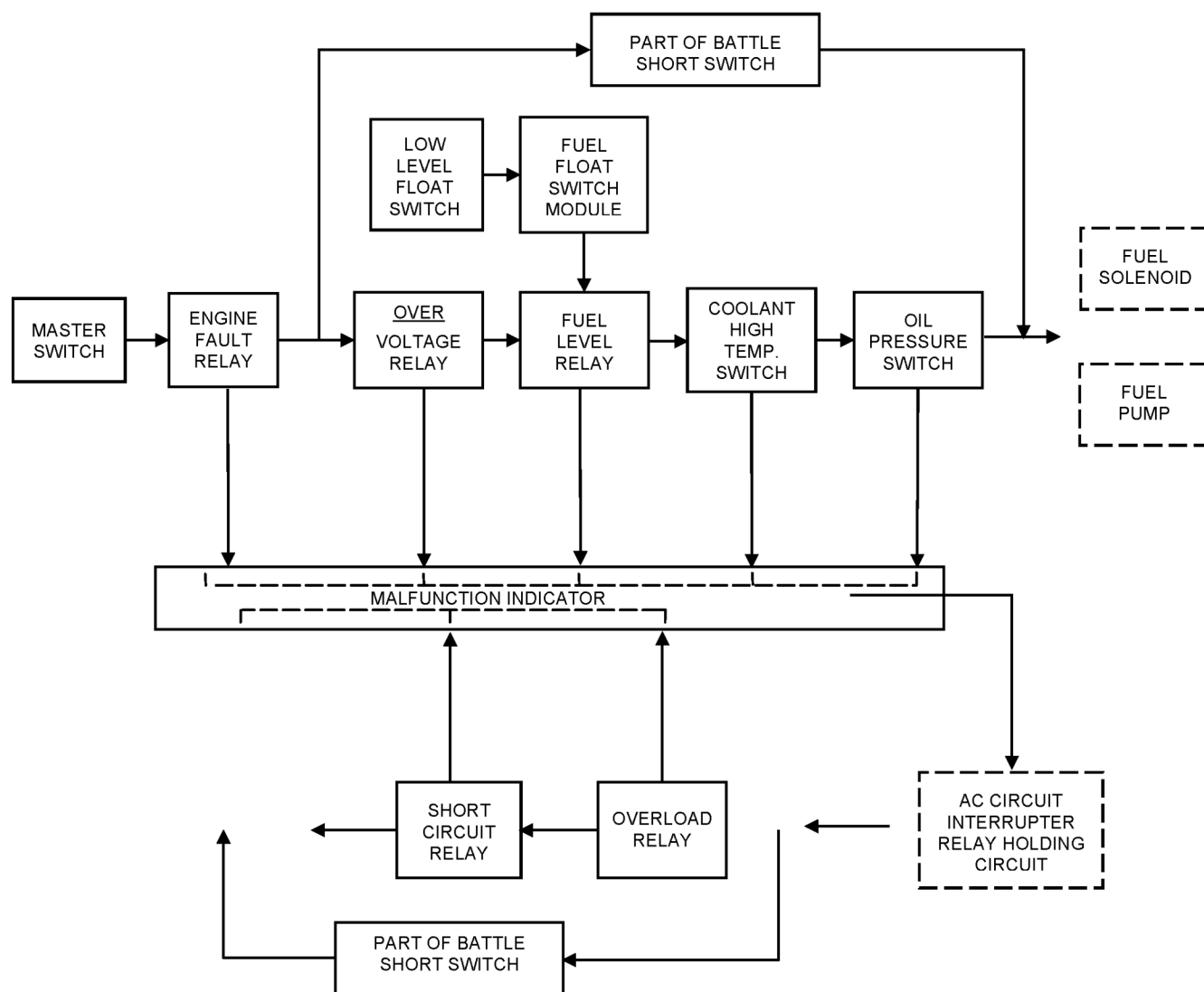


Figure 3. Fault System.

Although it is possible for more than one fault to occur at one time during operation, only the first fault to occur will be displayed by the malfunction indicator. The activated indicator lamp circuit remains illuminated until the malfunction indicator is reset. The lamp will be off with the MASTER SWITCH in the OFF position and will be reilluminated when the MASTER SWITCH is turned to one of the RUN positions. Resetting a fault indication is done in two steps. First, push the PUSH TEST & RESET LAMPS switch located on the malfunction indicator. Second, move the MASTER SWITCH to the OFF position. The generator set cannot be cranked unless both actions are completed. The indicated fault must be corrected before any attempt is made to restart the generator set or does the AC circuit interrupter relay.

After the generator set engine has been started, the BATTLE SHORT switch can be used to override all of the potential faults except engine overspeed and short circuit.

Fuel System

The fuel system (Figure 4) includes a primary subsystem and an auxiliary subsystem.

PRINCIPLES OF OPERATION – CONTINUED

The primary subsystem consists of fuel lines, fittings, fuel tank, low fuel level float switch, fuel float switch module, fuel level sender, FUEL LEVEL indicator, fuel transfer pump, fuel filter/water separator, two injection pumps, and two injectors.

The injection pump output is controlled by a mechanical engine governor. The governor also includes a fuel solenoid operated shutoff level which stops operation of the injection pumps when the solenoid is de-energized. With the MASTER SWITCH in the START or either of the two RUN positions, both the fuel solenoid and the fuel transfer pump are energized. The fuel solenoid positions the shutoff lever to the open position, and the transfer pump starts drawing fuel from the fuel tank. After reaching the transfer pump, fuel passes through a fuel filter/water separator where water and small impurities are removed. The fuel then goes to the injection pump. With the engine cranking or running the fuel is metered, pressurized, and pushed through the injectors by the injection pump. Fuel is sprayed by the injectors into the diesel engine combustion chambers where it is mixed with air and ignited. The fuel that is not used by the injectors is returned to the fuel tank by an excess fuel return line. Power is removed from the fuel solenoid and the transfer pump, stopping the engine whenever the MASTER SWITCH is turned to the OFF position. The fuel solenoid and transfer pump are also de-energized by the fault system (Fault System). The fuel level sender measures tank level which is indicated by the FUEL LEVEL indicator from E (empty) to F (full) in quarter tank increments.

The auxiliary subsystem consists of an auxiliary fuel supply, fuel lines, fittings, auxiliary fuel filter, auxiliary fuel pump, auxiliary fuel pump float switch located in the fuel tank, and a fuel float switch module.

When the MASTER switch is set on PRIME & RUN AUX FUEL, it actuates the auxiliary fuel pump and transfers fuel from the auxiliary fuel supply to the fuel tank. The auxiliary fuel pump float switch shuts off the auxiliary fuel pump when the fuel tank is full and reactivates the pump as the level drops. The fuel float switch module allows the current used by the auxiliary fuel pump to bypass the float switch.

The 24 VDC control circuits provide control and power for indicators, float switches, fault system, governor system, and auxiliary fuel pump.

PRINCIPLES OF OPERATION – CONTINUED

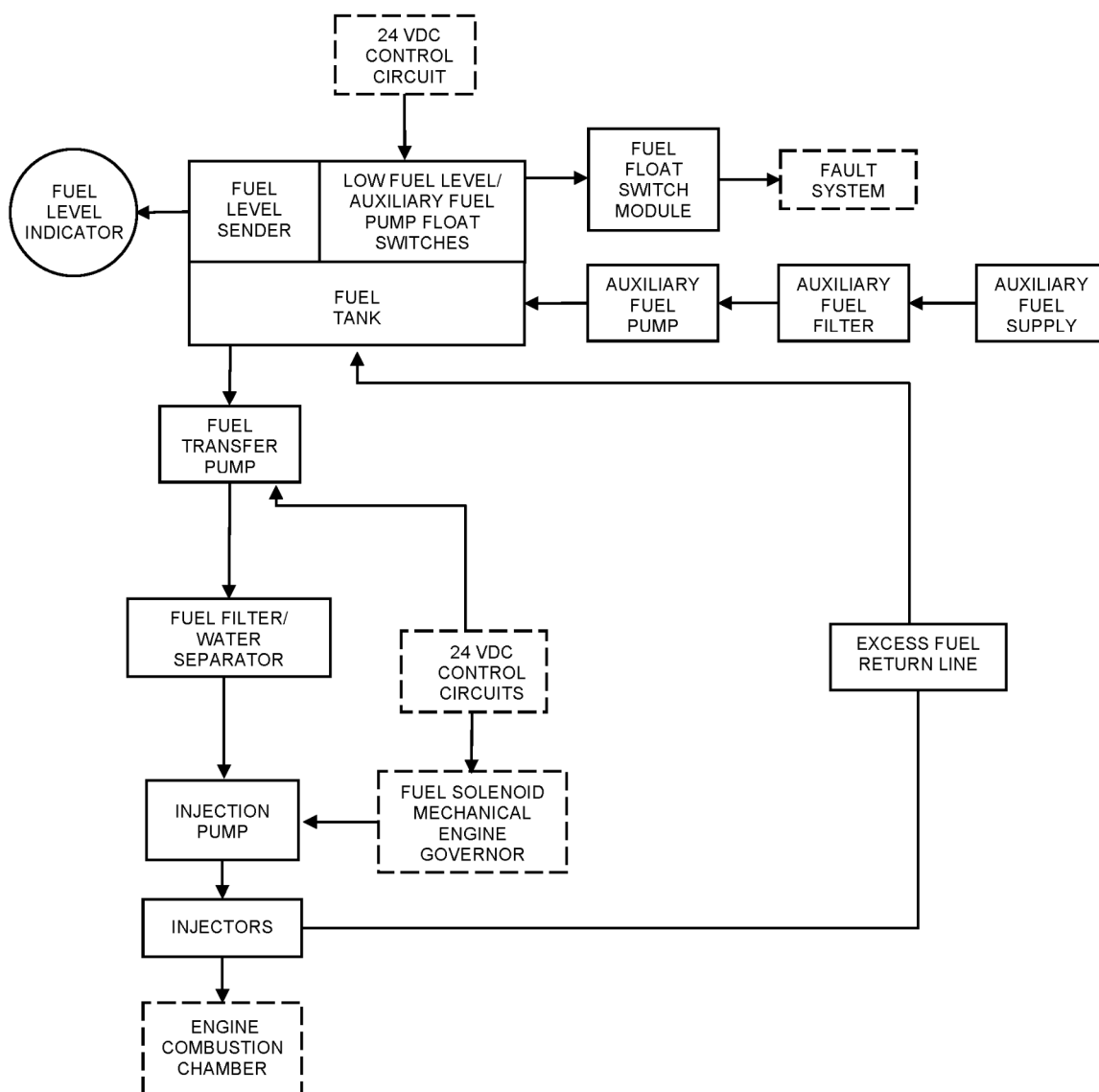


Figure 4. Generator Set Fuel System.

Generator Set Cooling System

The generator set cooling system (Figure 5) includes air intake and exhaust grilles, baffles and ducting within the generator set housing, and engine-driven radiator cooling fan. The air intake grilles are located in panels on both sides of the generator set housing. The air exhaust grille is located in the housing top panel.

Air is drawn in through the air intake grilles and forced through the engine coolant radiator and out of the generator set through the exhaust grille by the radiator cooling fan. Most of the cooling air flows externally past the generator assembly and engine. Some cooling air is circulated internally through the generator assembly by a generator fan which is an integral part of the AC generator assembly. Baffles, ducting, and sound-absorbing material are used to control the airflow through the generator set and to reduce sound transmission through the grilles.

PRINCIPLES OF OPERATION – CONTINUED

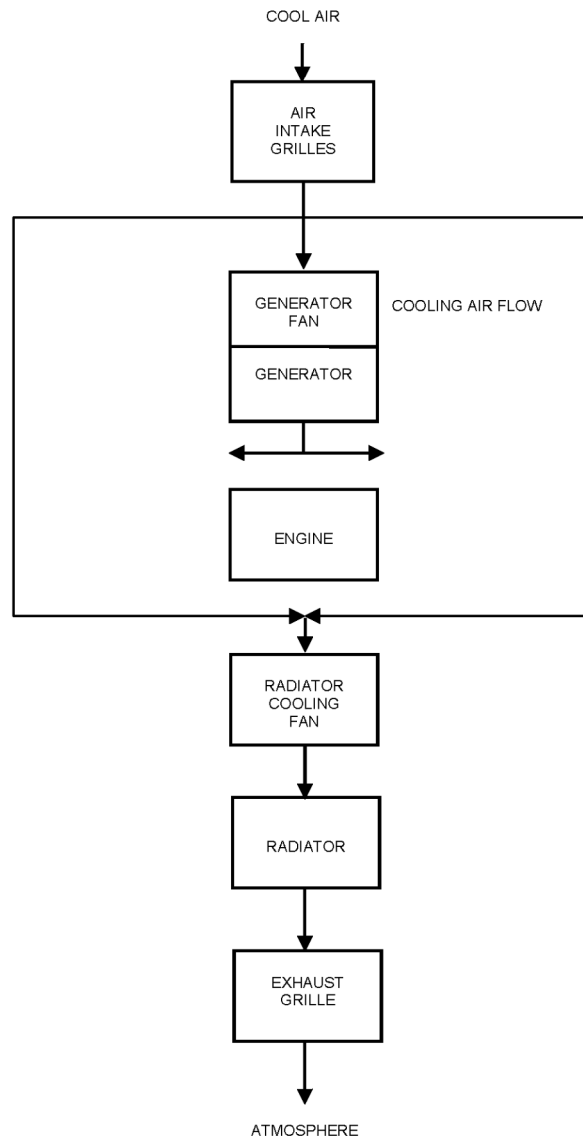


Figure 5. Generator Set Cooling System.

Engine Cooling System

The engine cooling system (Figure 6) consists of a radiator, hoses, thermostat, temperature sender, coolant high temperature switch, COOLANT TEMP indicator, water pump, belt-driven fan, and cooling jackets (part of engine).

The water pump forces coolant through passages (cooling jackets) in the engine block and cylinder head where the coolant absorbs heat from the engine. When the engine reaches normal operating temperature, the thermostat opens and the heated coolant flows through the upper radiator hose assembly into the radiator. The cooling fan circulates air through the radiator where the coolant temperature is reduced.

A coolant high temperature switch in conjunction with the fault system provides automatic shutdown in the event that coolant temperature exceeds 225 ± 5 °F (104 ± 2 °C). The COOLANT TEMP indicator indicates the engine coolant temperature from 120 to 240 °F (48 to 115 °C).

PRINCIPLES OF OPERATION – CONTINUED

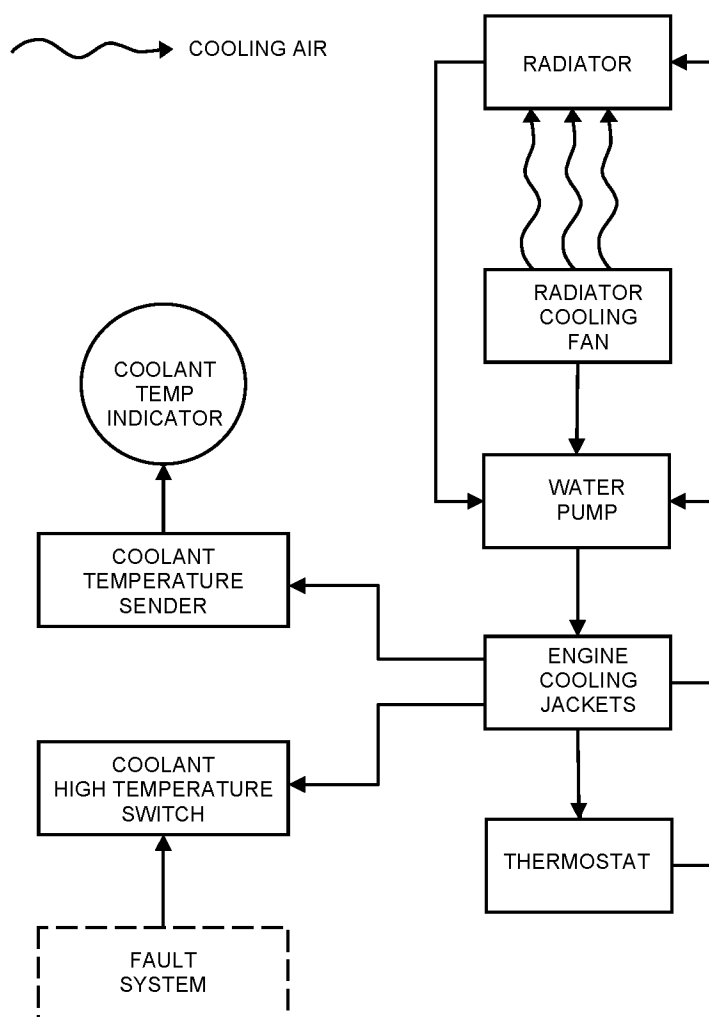


Figure 6. Engine Cooling System.

Engine Lubrication System

The engine lubrication system (Figure 7) consists of an oil pan, dipstick, pump, oil sample valve, oil pressure sender, OIL PRESSURE indicator, low oil pressure switch, and filter.

The oil pan is a reservoir for engine lubricating oil. The dipstick indicates oil level in the pan. The oil level can only be checked when the engine is not running. The pump draws oil from the oil pan through a screen that removes large impurities. The oil then passes through a spin-on type filter where small impurities are removed. From the filter, oil is distributed to the engine's internal moving parts and then returns to the oil pan. The oil pressure sender located in the engine block senses oil pressure. The oil pressure is displayed on the OIL PRESSURE indicator. The low oil pressure switch, also located in the engine block, functions with the generator set fault system. The engine is automatically shut off if the oil pressure drops below 15 ± 3 psi (103.4 ± 20.7 kPa).

PRINCIPLES OF OPERATION – CONTINUED

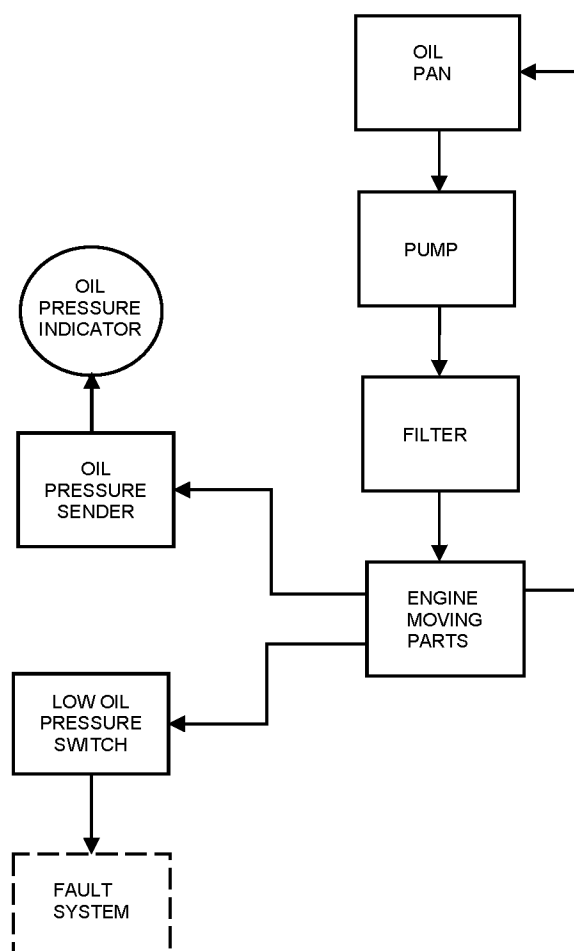


Figure 7. Engine Lubrication System.

Engine Air Intake and Exhaust System

The engine air intake and exhaust system (Figure 8) consists of an air cleaner assembly, intake manifold, two glow plugs, exhaust manifold, and muffler. The air cleaner assembly includes a dust collector, filter element, and restriction indicator.

Air is drawn into the dust collector and passes through the filter element. Airborne dirt is removed and trapped in the dust collector and filter element. Some dust can be removed from the dust collector by pinching the evacuator valve. The restriction indicator indicates when the filter should be serviced. Filtered air is drawn out of the filter through air intake tubes to the intake manifold where it passes into the engine.

The engine exhaust gases are expelled into the exhaust manifold. The exhaust manifold channels the gases into the muffler to deaden the sound of the exhaust gases. The gases pass from the muffler through the muffler outlet and are vented upward from the generator set housing. A cover, which is held open by the pressure of the exhaust gases during operation, closes over the exhaust port to prevent rain, water, or other foreign matter from entering the exhaust port when the set is not in use. The cover is easily removed for connection of an exhaust pipe for indoor operation.

To improve engine starting when ambient temperature is below 40 °F (4 °C), a preheat system is used. On the Isuzu engine (MEP-804A/MEP-814A), a glow plug is located in the engine head for each cylinder. On the Yanmar engine (MEP-804B/MEP-814B), two air intake preheaters are used. The glow plugs/air intake preheaters are energized through contactor K22 when the MASTER SWITCH is held in the PREHEAT position.

PRINCIPLES OF OPERATION – CONTINUED

The DC control circuit provides power to the preheat relay and heater plugs.

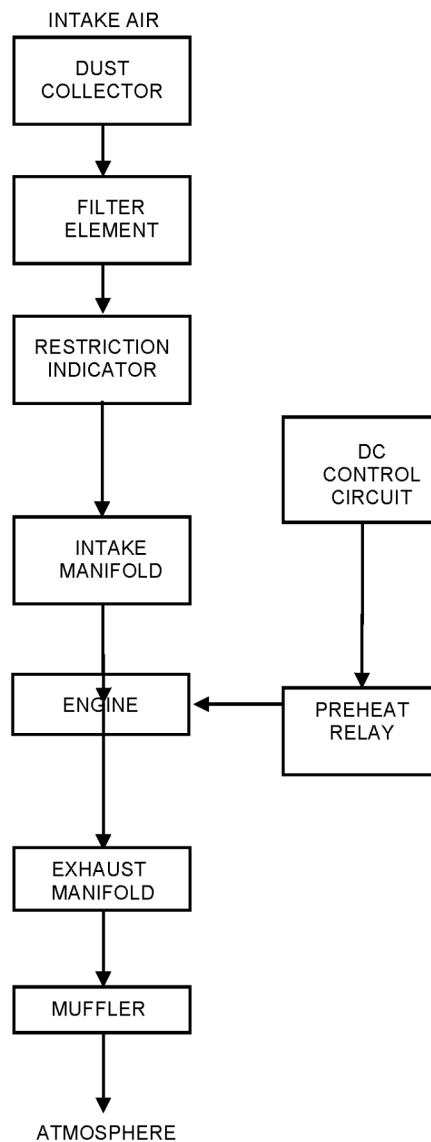


Figure 8. Engine Air Intake and Exhaust System.

Output Supply System

The output supply system (Figure 9) consists of the AC generator, AC voltage reconnection switch, GROUND FAULT CIRCUIT INTERRUPTER (GFCI), CONVENIENCE RECEPTACLE, current transformer, AC circuit interrupter relay, output terminals, AC CIRCUIT INTERRUPTER switch, VM-AM transfer switch, AC voltmeter (VOLTS AC), and ammeter (PERCENT RATED POWER), frequency transducer, and FREQUENCY meter (HERTZ).

Power created by the generator is supplied through the current transformer, AC voltage reconnection switch, and AC circuit interrupter relay to the output terminals. The AC voltage reconnection switch allows configuration of the generator set for the following voltage connections: 120 volt, single phase, 2 wire; 120/240 volt, single phase, 3 wire; and 120/208 volt, 3 phase, 4 wire. The generator also provides 120 VAC to the CONVENIENCE RECEPTACLE through the GROUND FAULT CIRCUIT INTERRUPTER.

PRINCIPLES OF OPERATION – CONTINUED

The AC CIRCUIT INTERRUPTER switch closes and opens the AC circuit interrupter relay. This enables or interrupts the power flow between the voltage reconnection switch and the output terminals. The voltage regulation system (Voltage Regulation System) senses generator output voltage and provides a control signal to the generator exciter to maintain the desired generator output voltage. Generator output frequency is controlled by the governor control system (Governor Control System), sensed by the frequency transducer and is read on the FREQUENCY meter (HERTZ). The current transformer provides a reduced current signal to the ammeter (PERCENT RATED CURRENT) which indicates the percent of rated current being supplied to the load. The position of the VM-AM transfer switch selected the load terminal from which current and voltage are measured. The AC circuit interrupter relay will open and disconnect the load whenever an overload or short circuit occurs.

The GND (ground terminal) is connected to the generator set skid base. This terminal is also connected to the ground rod for all generator set operation. The removable link provides a removable, low inductance connection between L0 and GND terminals. This removable link must be in place for all generator set operation except when the load instructions specifically require its removal.

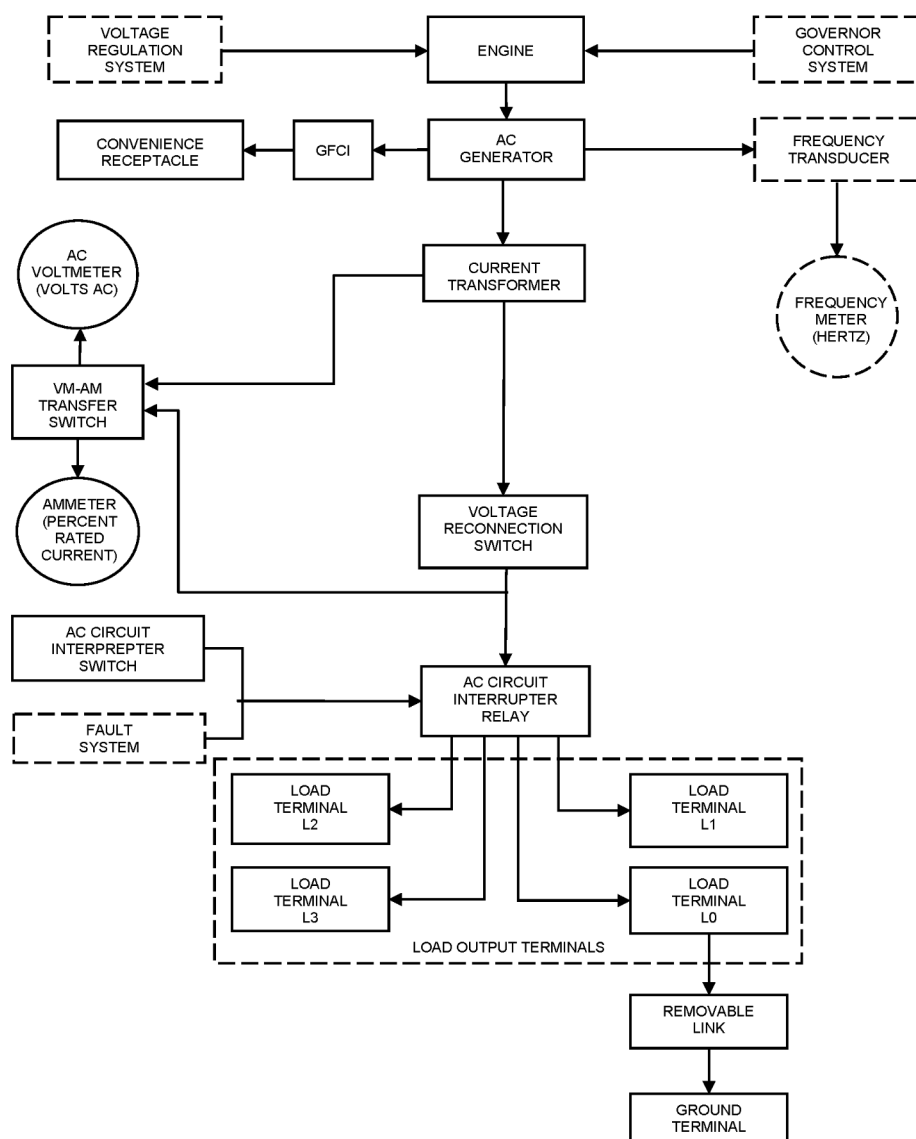


Figure 9. Output Supply System.

GENERATOR SET CONTROLS

Engine Starting System

Engine starting is accomplished primarily with two 12 volt batteries, connected in series to provide 24 VDC power, and a starter (Figure 10). The starter includes a cranking motor and a solenoid. To permit engine starting, the DC CONTROL POWER circuit breaker must be pushed in, the DEAD CRANK switch must be in the NORMAL position, and the BATTLE SHORT switch must be in the OFF position. In addition, any ENGINE SHUTDOWN fault previously registered on the malfunction indicator panel must have been corrected and the malfunction indicator panel must have been reset. When the MASTER SWITCH is then placed in the START position, the starting circuits supply 24 VDC power to the starter. As the engine accelerates to approximately 900 rpm, the starting circuits disconnect power from the starter and energize the field flash relay. After the needle of the AC voltmeter (VOLTS AC) reaches rated voltage, indicating that the generator is producing power, the MASTER SWITCH can be moved to one of the two RUN positions for generator operation.

When the MASTER SWITCH is first moved to the START position, the various instrument and control circuits including two starting control circuits are energized. One starting control circuit supplies 24 DVC power directly to the control functions of the crank disconnect switch and also energizes the coil of the crank disconnect relay through closed contacts of BATTLE SHORT switch and crank disconnect switch. The other starting control circuit directly energizes the coil of the field flash relay and also energizes the cranking relay coil through closed contacts of the engine fault relay and crank disconnect relay. With the cranking relay energized, power passes from the batteries through closed contacts of the cranking relay to energize the starter solenoid and the pulling coil of the fuel solenoid. With the starter solenoid energized, power passes from the starter solenoid to the cranking motor. The cranking motor then cranks the engine. As the engine accelerates to approximately 900 rpm, the signal from the magnetic pickup causes the crank disconnect switch to break the circuit to the coil of the crank disconnect relay and close the contacts of the field flash relay. When the MASTER SWITCH is moved to one of the two RUN positions, both starting control circuits are de-energized. The other generator set control and instrument circuits remain energized.

The engine may be cranked without starting by use of the DEAD CRANK switch. With the DEAD CRANK switch in the CRANK position, the cranking relay coil is energized to initiate engine cranking without energizing any other starting or control functions.

The generator set can be started without batteries by connecting an external 24 VDC power source to the NATO slave receptacle. The generator set can also supply starting power to another generator set through the NATO slave receptacle.

The batteries are charged by the battery charging alternator that is belt-driven by the engine. Generator set control system power is also supplied by the battery charging alternator. The BATTERY CHARGE ammeter indicates the charge/discharge rate of the batteries from -10 amps to +20 amps. A shunt provides a DC voltage signal, which is directly proportional to the actual battery current flow, to the BATTERY CHARGE ammeter. Normal operating indication on the BATTERY CHARGE ammeter depends on the state of the charge in the batteries. A low charge, which may exist immediately after engine starting, will cause a high reading (needle moves toward CHARGE area). When the charge in the batteries has been restored, the indicator moves near zero (0). The battery charging system is protected from reverse polarity in the battery connections by a fuse and diode.

Field Flash. When the engine reaches sufficient speed (900 rpm), the magnetic pickup causes a set of contacts in the crank disconnect switch to close and energize the field flash relay. This circuit provides current to the exciter field windings which sets up an electromagnetic field. The field current is necessary for the set to generate sufficient voltage for the voltage regulator to begin controlling the output voltage of the generator set. The field flash circuit is maintained until the MASTER SWITCH is released from the START position.

Operation. Placing the MASTER SWITCH in the PRIME & RUN or PRIME & RUN AUX FUEL position keeps the electronic governor control energized, and fuel will be supplied to the fuel injection pump as long as no fault condition exists. During operation, the operator should periodically check generator set instruments to ensure they are reading in the normal operating ranges. The VOLTAGE and FREQUENCY potentiometers are adjusted as required to maintain desired frequency and voltage output.

GENERATOR SET CONTROLS – CONTINUED

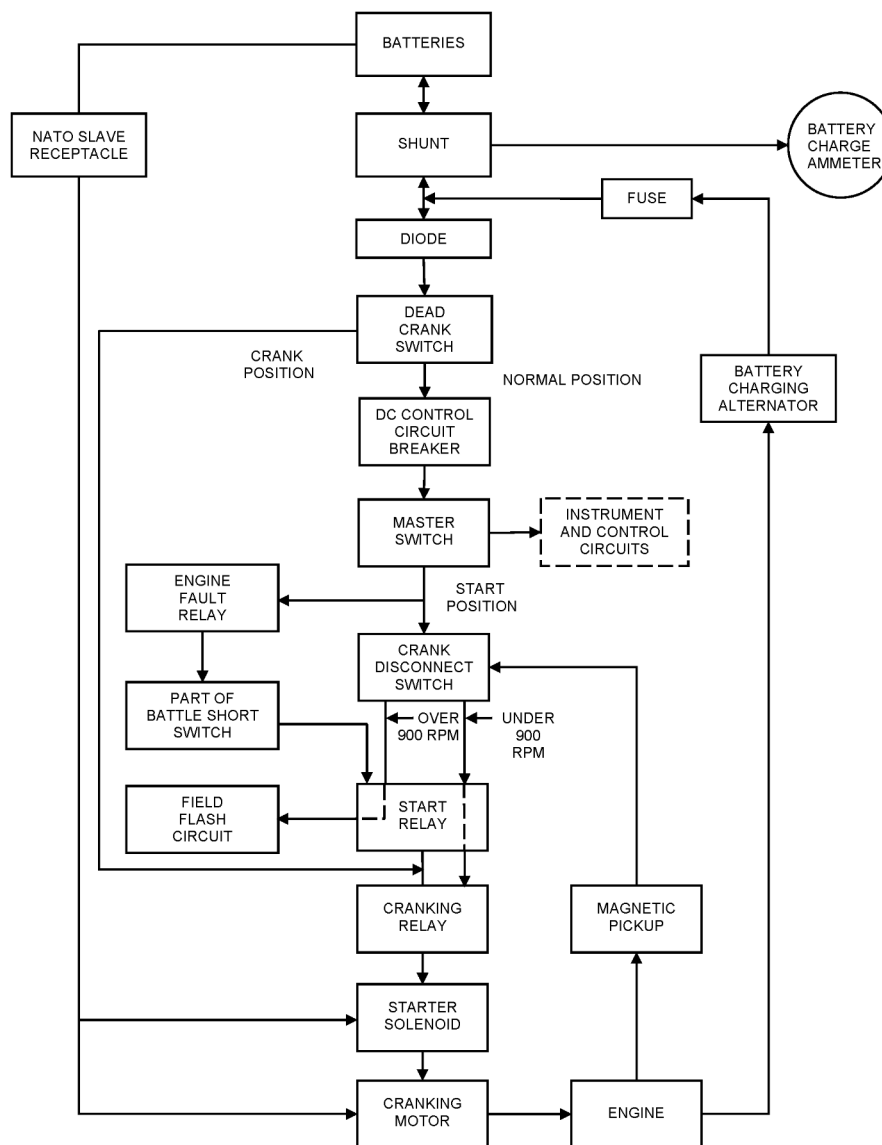


Figure 10. Engine Starting System.

Applying the Load. The load is applied by placing the AC CIRCUIT INTERRUPTER switch in the CLOSED position. This is a momentary contact switch that returns to the neutral or center position. The AC circuit interrupter relay is energized by this momentary contact and a holding circuit keeps it closed, bringing the load on line.

Shutdown

The AC circuit interrupter relay is disengaged by placing the AC CIRCUIT INTERRUPTER switch in the OPEN position. This is a momentary contact switch which will break the AC circuit interrupter relay holding circuit and then return to the neutral or center position disconnecting the load from the line.

When the MASTER SWITCH is placed in the OFF position, all power is removed from the control circuit and the engine will stop.

GENERATOR SET CONTROLS – CONTINUED

The EMERGENCY STOP switch assembly will remove power from the control circuit by energizing the engine fault relay. This will cause the engine to shut down. The EMERGENCY STOP switch assembly is not to be used as an alternative for routine shutdown procedures. When the generator set is stopped using the EMERGENCY STOP switch assembly, some circuits remain energized causing a drain on the batteries until the MASTER SWITCH is placed in the OFF position.

Governor Control System

The governor control system (Figure 11) includes the FREQUENCY ADJUST control, mechanical engine governor, engine fuel pump rack and fuel solenoid.

The mechanical engine governor is housed under the engine gear cover and moves the fuel pump rack, changing fuel delivery of the injection pumps in proportion to engine load. The governor is a flyweight type, with the weights mounted on the engine camshaft gear. The force of the flyweights is transferred through a thrust sleeve and collar to the governor lever, and balanced against the tension of the governor spring, which is stretched between the governor lever and the speed adjustment lever. Engine speed and generator output frequency are increased by increasing the tension on the main governor spring. Droop is adjusted by varying the location of the governor spring's mounting to the governor lever, effectively varying the strength of the spring.

The governor uses one lever for fuel shutoff and the other for speed adjustment. The shutoff lever is operated by the fuel solenoid in an energize-to-run configuration (fail safe). The speed adjustment lever is moved by a vernier control cable from the FREQUENCY ADJUST control of the set and provides an adjustment range of ± 3 percent of rated frequency.

Voltage Regulation System

The voltage regulation system (Figure 12) consists of the AC voltage regulator and VOLTAGE adjust potentiometer. The AC voltage regulator senses and controls the generator output voltage which is operator adjustable within the design limits by use of the VOLTAGE adjust potentiometer. The output voltage is indicated by the AC voltmeter (VOLTS AC) on the control panel.

GENERATOR SET CONTROLS – CONTINUED

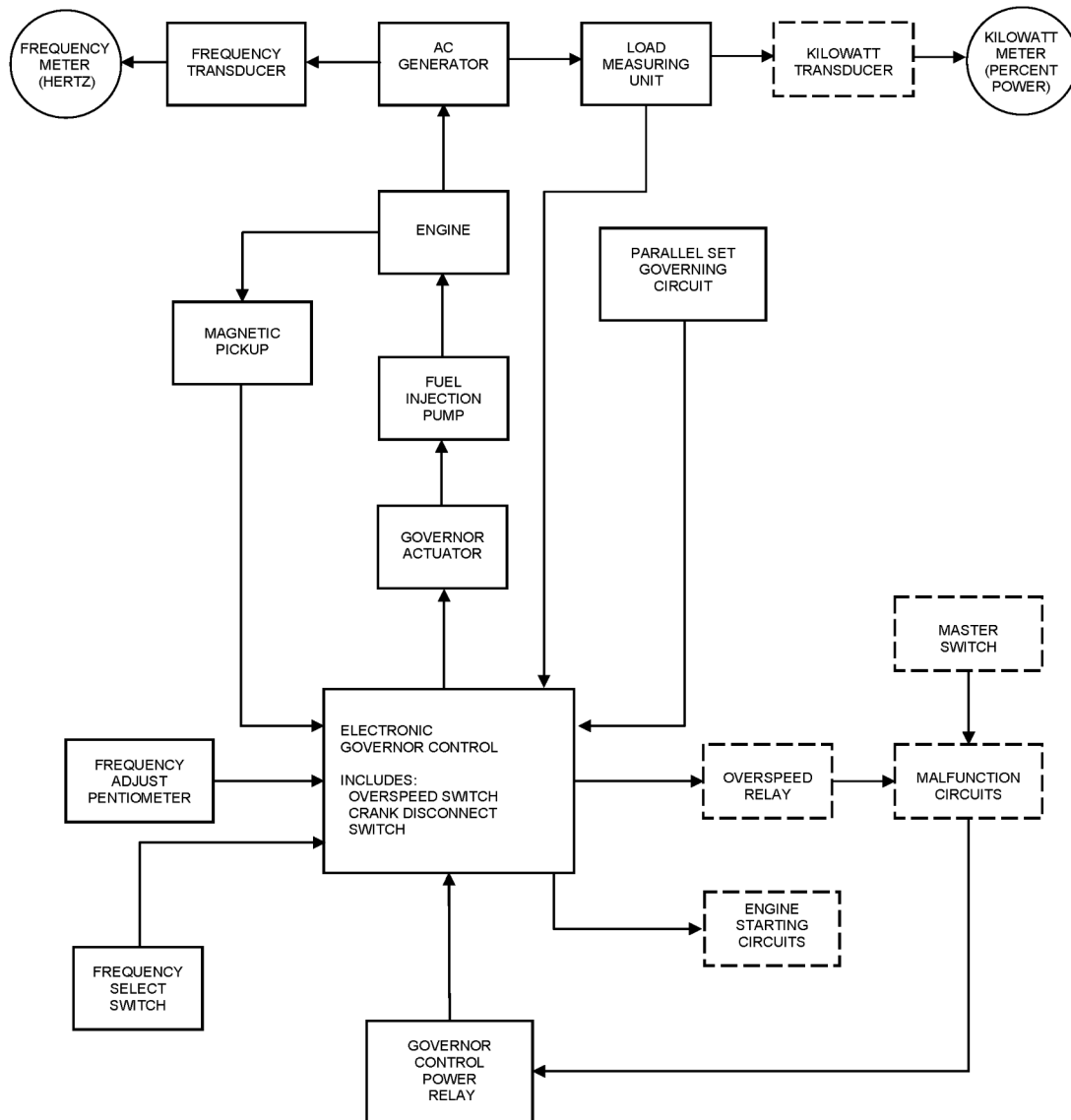


Figure 11. Governor Control System.

GENERATOR SET CONTROLS – CONTINUED

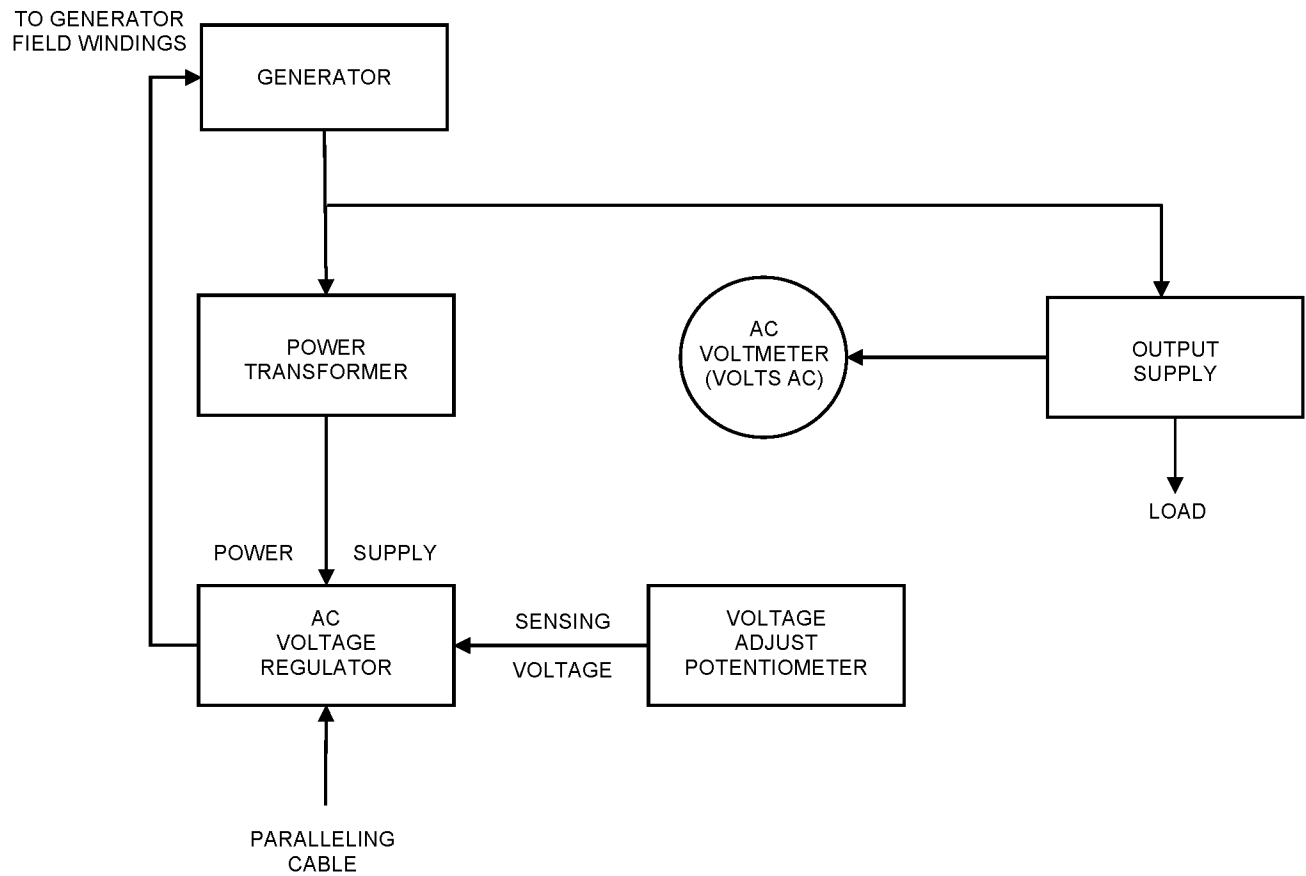


Figure 12. Voltage Regulation System.

END OF WORK PACKAGE

CHAPTER 2

FIELD TROUBLESHOOTING PROCEDURES

FIELD MAINTENANCE

TROUBLESHOOTING INDEX

FIELD TROUBLESHOOTING PROCEDURES

Purpose of Troubleshooting Table.

This section contains troubleshooting information for locating and correcting operating troubles which may develop in the generator set. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

This table cannot list all malfunctions that can occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or cannot be corrected by listed corrective actions, notify your supervisor.

NOTE

Before you use this table, be sure you have performed your PMCS.

Refer to the Diagnostic Connector Connection Points WP 0034, Table 1, Electrical Schematic FO-1, and Wiring Diagram FO-2 as troubleshooting aids.

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX

Malfunction/Symptom	Troubleshooting Procedure
---------------------	---------------------------

COOLING SYSTEM

- | | |
|---|------------|
| 1. Engine Coolant Temperature too Low | Symptom 14 |
| 2. Engine Overheating | Symptom 13 |

ELECTRICAL SYSTEM

- | | |
|---|------------|
| 3. AC Voltmeter (VOLTS AC) Does Not Indicate Voltage | Symptom 22 |
| 4. AC Voltmeter (VOLTS AC) Indicates Voltage but Frequency Meter (Hertz) is Off Scale | Symptom 24 |
| 5. AC Voltmeter (VOLTS AC) Voltage Fluctuates | Symptom 25 |
| 6. Battery Charge Ammeter Shows Excessive Charging After Prolonged Operation | Symptom 21 |
| 7. Battery Charge Ammeter Shows No Charge When Batteries are Low or Discharged | Symptom 20 |
| 8. FREQUENCY Meter (HERTZ) Frequency Fluctuates | Symptom 26 |
| 9. Generator Noisy When Running | Symptom 29 |
| 10. Generator Set Fails to Generate Power | Symptom 23 |
| 11. Generator Set Fails To Generate Sufficient Voltage | Symptom 27 |
| 12. Generator Set Output Flutuates | Symptom 28 |
| 13. No Voltage at Convenience Receptacle | Symptom 30 |

ENGINE

- | | |
|--|------------|
| 14. Abnormal Engine Noise | Symptom 19 |
| 15. Coolant in Crankcase or Oil in Coolant | Symptom 16 |
| 16. Engine Cranks but Fails to Start | Symptom 2 |
| 17. Engine Does Not Develop Full Power | Symptom 6 |
| 18. Engine Fails to Crank | Symptom 1 |
| 19. Engine Fails to Start in Cold Weather | Symptom 18 |
| 20. Engine Knocks | Symptom 7 |
| 21. Engine Misfiring | Symptom 5 |
| 22. Engine Runs Erratically or Stalls Frequently | Symptom 4 |

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX – CONTINUED

23. Engine Stops Suddenly	Symptom 3
24. Engine Vibrating	Symptom 17
25. Excessive Fuel Consumption	Symptom 15

EXHAUST SYSTEM

26. Black or Grey Smoke in Exhaust	Symptom 8
27. Blue or White Exhaust Smoke	Symptom 9

LUBRICATION SYSTEM

28. High Oil Consumption	Symptom 10
29. High Oil Pressure	Symptom 12
30. Low Oil Pressure	Symptom 11

END OF WORK PACKAGE

FIELD MAINTENANCE

TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

References

TM-9-2815-252-24
 TM-9-2815-252-24P
 Service Upon Receipt (WP 0006)
 Batteries (WP 0010)
 Battery Charging Alternator (WP 0012)
 Battery Charger Fuse Assembly (WP 0023)
 DC Control Power Circuit Breaker (WP 0024)
 AC Voltage Regulator (WP 0025)
 AC Voltage Regulator (WP 0025)
 Frequency Transducer (WP 0026)
 Shunt (WP 0027)
 Crank Disconnect Switch (WP 0030)
 Relays (WP 0031)
 Resistor-Diode Assembly (WP 0032)
 Coolant Temperature Indicator (WP 0039)
 Oil Pressure Indicator (WP 0040)
 Battery Charge Ammeter (WP 0042)
 Frequency Meter (Hertz) (WP 0043)
 AC Voltmeter (VOLTS AC) (WP 0045)
 Master Switch (WP 0046)
 Voltage Adjust Potentiometer (WP 0047)
 Emergency Stop Switch Assembly (WP 0048)
 Battle Short Switch (WP 0049)
 VM-AM Transfer Switch (WP 0051)
 AC Circuit Interrupter Relay (WP 0063)

References - cont'd

Cranking Relay (WP 0064)
 Voltage Reconnection Switch (WP 0066)
 Muffler (WP 0067)
 Air Restriction Indicator (WP 0068)
 Air Cleaner Assembly (WP 0069)
 Air Cleaner Element (WP 0070)
 Coolant System (WP 0071)
 Radiator (WP 0072)
 Upper Coolant Hose (WP 0073)
 Lower Coolant Hose (WP 0074)
 Cooling Fan (WP 0076)
 Fan Belt (WP 0077)
 Low Pressure Fuel Lines (WP 0082)
 Fuel Transfer Pump (WP 0087)
 Fuel Filter/Water Separator Element (WP 0089)
 Frequency Adjust Control Cable (WP 0091)
 Oil Pressure Sender (WP 0093)
 Coolant Temperature Sender (WP 0094)
 Fuel Solenoid (WP 0097)
 Dead Crank Switch (WP 0098)
 Adjustments and Tests (WP 0106)
 Generator Assembly (MEP-802A) (WP 0107)
 Generator Assembly (MEP-812A) (WP 0108)

Equipment Condition

Grounded, Off & Operational

Drawings Required

Electrical Schematic (FO-1)
 Wiring Diagram (FO-2)

TROUBLESHOOTING PROCEDURE(S)**SYMPTOM**

1. ENGINE FAILS TO CRANK.

TEST OR INSPECTION

Step 1. Test for defective DEAD CRANK switch (S10) (WP 0098, Testing).

CORRECTIVE ACTION

- a. If DEAD CRANK switch is not defective, do Step 2.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If defective, replace DEAD CRANK switch (WP 0098).

TEST OR INSPECTION

Step 2. Check for loose or corroded battery cable terminals or battery posts.

CORRECTIVE ACTION

- a. If terminals are tight and posts are clean, do Step 3.
- b. If not clean and tight, clean and tighten battery cable terminals and posts (WP 0010, Service.).

TEST OR INSPECTION

Step 3. Check that batteries are installed correctly (WP 0010, Installation).

CORRECTIVE ACTION

- a. If batteries are installed correctly, do Step 4.
- b. If not incorrectly installed, install batteries correctly (WP 0010, Installation).

TEST OR INSPECTION

Step 4. Test for low or no battery charge (WP 0010, Testing).

CORRECTIVE ACTION

- a. If fully charged, do Step 5.
- b. If not fully charged, replace batteries (WP 0010).

TEST OR INSPECTION

Step 5. Test for defective DC CONTROL POWER circuit breaker (CB1) (WP 0024, Testing).

CORRECTIVE ACTION

- a. If DC CONTROL POWER circuit breaker is not defective, do Step 6.
- b. If defective, replace DC CONTROL POWER circuit breaker (WP 0024).

TEST OR INSPECTION

Step 6. Test for battery voltage at terminal 1 of starter solenoid (L4), refer to FO-1.

CORRECTIVE ACTION

- a. If battery voltage is present, do Step 7.
- b. If battery voltage is not present, check for loose connections from solenoid to batteries.

TEST OR INSPECTION

Step 7. Test for battery voltage at + terminal of starter solenoid with MASTER SWITCH in START position. Refer to FO-1.

CORRECTIVE ACTION

- a. If battery voltage is present, replace starter solenoid (TM 9-2815-252-24).

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If battery voltage is not present, do Step 8.

TEST OR INSPECTION

Step 8. Test for battery voltage at input of MASTER SWITCH (S1), refer to FO-1.

CORRECTIVE ACTION

- a. If battery voltage is present at input terminal (6) and ground, do Step 9.
- b. If battery voltage is not present at input terminal (6) and ground, do Step 10.

TEST OR INSPECTION

Step 9. Test MASTER SWITCH for output voltage in START position, refer to FO-1.

CORRECTIVE ACTION

- a. If battery voltage is present at MASTER SWITCH output terminal (7) and ground, do Step 13.
- b. If battery voltage is not present at output terminal (7) and ground, test MASTER SWITCH (WP 0046, Testing).

TEST OR INSPECTION

Step 10. Test for defective battery charging ammeter shunt (WP 0027, Testing).

CORRECTIVE ACTION

- a. If not defective, do Step 11.
- b. If defective, replace battery charging ammeter shunt (WP 0027).

TEST OR INSPECTION

Step 11. Test for defective Reverse Battery Diode (CR1) (WP 0032, Testing).

CORRECTIVE ACTION

- a. If not defective, do Step 12.
- b. If defective, replace reverse battery diode (WP 0032).

TEST OR INSPECTION

Step 12. Test for defective EMERGENCY STOP switch (S17) (WP 0048, Testing).

CORRECTIVE ACTION

- a. If not defective, do Step 13.
- b. If defective, replace EMERGENCY STOP switch (WP 0048).

TEST OR INSPECTION

Step 13. Test for defective engine fault relay (K12) (WP 0031, Testing).

CORRECTIVE ACTION

- a. If engine fault relay is not defective, do Step 14.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If defective, replace engine fault relay (WP 0031).

TEST OR INSPECTION

Step 14. Test for defective BATTLE SHORT switch (S7) (WP 0049, Testing).

CORRECTIVE ACTION

- a. If not defective, do Step 15.
- b. If defective, replace BATTLE SHORT switch (WP 0049).

TEST OR INSPECTION

Step 15. Test for defective crank disconnect switch (S14) (WP 0030, Testing).

CORRECTIVE ACTION

- a. If crank disconnect switch is not defective, do Step 16.
- b. If defective, replace crank disconnect switch (WP 0030).

TEST OR INSPECTION

Step 16. Test for defective crank disconnect relay (K16) (WP 0031, Testing).

CORRECTIVE ACTION

- a. If crank disconnect relay is not defective, do Step 17.
- b. If defective, replace crank disconnect relay (WP 0031).

TEST OR INSPECTION

Step 17. Check starting circuit for breaks or loose connections, refer to FO-1.

CORRECTIVE ACTION

- a. If starting circuit has no breaks and connections are tight, do Step 18.
- b. If defective, repair or replace defective wires or connections.

TEST OR INSPECTION

Step 18. Test for defective cranking relay (K2) (WP 0064).

CORRECTIVE ACTION

- a. If cranking relay is not defective, do Step 19.
- b. If defective, replace cranking relay (WP 0064).

TEST OR INSPECTION

Step 19. Test for defective starter solenoid (L4) (TM 9-2825-252-24).

CORRECTIVE ACTION

- a. If starter solenoid is not defective, do Step 20.
- b. If defective, replace starter solenoid in accordance with TM 9-2825-252-24.

TROUBLESHOOTING PROCEDURES – CONTINUED**TEST OR INSPECTION**

Step 20. Test for defective starting motor (TM 9-2825-252-24).

CORRECTIVE ACTION

- a. If defective, replace starting motor in accordance with TM 9-2815-252-24.
- b. If starting motor is not defective, notify next higher level of maintenance.

SYMPTOM

2. ENGINE CRANKS BUT FAILS TO START.

TEST OR INSPECTION

Step 1. Test for low battery charge (WP 0010, Testing).

CORRECTIVE ACTION

- a. If batteries are fully charged, do Step 2.
- b. If not fully charged, replace batteries (WP 0010).

TEST OR INSPECTION

Step 2. Check for clogged or defective fuel filter/water separator.

CORRECTIVE ACTION

- a. If fuel filter/water separator is not clogged or defective, do Step 3.
- b. If clogged or defective, service fuel filter/water separator (WP 0089).

TEST OR INSPECTION

Step 3. Check for blocked fuel line(s) and/or components.

CORRECTIVE ACTION

- a. If fuel lines are not blocked, do Step 4.
- b. If blocked, unblock or replace fuel line(s) and/or components (WP 0082 and WP 0087).

TEST OR INSPECTION

Step 4. Test for defective MASTER SWITCH (S1) (WP 0046, Testing).

CORRECTIVE ACTION

- a. If MASTER SWITCH is not defective, do Step 5.
- b. If defective, replace MASTER SWITCH (WP 0046).

TEST OR INSPECTION

Step 5. Test for defective fuel solenoid (L5) (WP 0097, Testing).

CORRECTIVE ACTION

- a. If fuel solenoid is not defective, do Step 6.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If defective, replace fuel solenoid (WP 0097).

TEST OR INSPECTION

Step 6. Test for defective fuel transfer pump (E2) (WP 0087, Testing).

CORRECTIVE ACTION

- a. If fuel transfer pump is not defective, do Step 7.
- b. If defective, replace fuel transfer pump (WP 0087).

TEST OR INSPECTION

Step 7. Check for contaminated or incorrect grade of fuel.

CORRECTIVE ACTION

- a. If fuel is not contaminated and is correct grade, do Step 8.
- b. If contaminated or incorrect grade, drain engine fuel system and service fuel filter/water separator (WP 0089). Drain generator set tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).

TEST OR INSPECTION

Step 8. Check for air in fuel lines.

CORRECTIVE ACTION

- a. If air in fuel lines, bleed fuel lines (TM 9-2815-252-24).
- b. If no air in fuel lines and trouble persists, notify next higher level of maintenance.

TEST OR INSPECTION

Step 9. Test for defective fuel injection nozzle(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection nozzle(s) is not defective, do Step 2.
- b. If defective, repair or replace fuel injection nozzle(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 10. Check fuel injection pump(s) timing (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection pump(s) timing is correct, do Step 3.
- b. If not correctly timed, time fuel injection pump(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 11. Test for defective fuel injection pump(s) (TM 9-2815-252-24).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

If defective, repair or replace fuel injection pump(s) (TM 9-2815-252-24).

SYMPTOM

3. ENGINE STOPS SUDDENLY.

TEST OR INSPECTION

Step 1. Check for tripped protective devices.

CORRECTIVE ACTION

- a. If no malfunction indicator lights are illuminated, do Step 2.
- b. If illuminated, correct fault indicated.

TEST OR INSPECTION

Step 2. Check for air lock in fuel supply line.

CORRECTIVE ACTION

- a. If no air lock in fuel supply line, do Step 3.
- b. If air in line, bleed fuel supply line (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check for blocked fuel line(s) and/or components.

CORRECTIVE ACTION

- a. If fuel line(s) are not blocked, do Step 4.
- b. If blocked, unblock or replace fuel line(s) and/or components (WP 0082 and WP 0087)

TEST OR INSPECTION

Step 4. Test for defective MASTER SWITCH (WP 0046, Testing).

CORRECTIVE ACTION

- a. If MASTER SWITCH is not defective, do Step 5.
- b. If defective, replace MASTER SWITCH (WP 0046).

TEST OR INSPECTION

Step 5. Test for defective fuel solenoid (WP 0097, Testing).

CORRECTIVE ACTION

- a. If fuel solenoid is not defective, do Step 6.
- b. If defective, replace fuel solenoid (WP 0097).

TEST OR INSPECTION

Step 6. Test for defective fuel transfer pump (WP 0087, Testing).

TROUBLESHOOTING PROCEDURES – CONTINUED

CORRECTIVE ACTION

- a. If fuel transfer pump is not defective, do Step 7.
- b. If defective, replace fuel transfer pump (WP 0087).

TEST OR INSPECTION

Step 7. Test for defective engine fault relay (K12) (WP 0031, Testing).

CORRECTIVE ACTION

- a. If defective, replace engine fault relay (WP 0031).
- b. If engine fault relay is not defective and trouble persists, notify next higher level of maintenance.

SYMPTOM

4. ENGINE RUNS ERRATICALLY OR STALLS FREQUENTLY.

TEST OR INSPECTION

Step 1. Check for obstruction in fuel line(s).

CORRECTIVE ACTION

- a. If fuel line(s) are not obstructed, do Step 2.
- b. If obstructed, unblock or replace fuel line(s) (WP 0082).

TEST OR INSPECTION

Step 2. Check for blocked exhaust pipe or muffler.

CORRECTIVE ACTION

- a. If exhaust pipe and muffler are not blocked, do Step 3.
- b. If blocked, unblock or replace exhaust pipe/muffler (WP 0067).

TEST OR INSPECTION

Step 3. Check for contaminated or incorrect grade of fuel.

CORRECTIVE ACTION

- a. If contaminated or incorrect grade, drain engine fuel system and service fuel filter/water separator (WP 0089). Drain generator set tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).
- b. If fuel is not contaminated or incorrect grade and trouble persists, notify next higher level of maintenance.

TEST OR INSPECTION

Step 4. Test for defective fuel injection nozzle(s) (TM 9-2815-252-24).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If fuel injection nozzle(s) is not defective, do Step 2.
- b. If defective, repair or replace fuel injection nozzle(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 5. Check fuel injection pump(s) timing (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection pump(s) timing is correct, do Step 3.
- b. If not correctly timed, time fuel injection pump(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 6. Test for defective fuel injection pump(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection pump(s) is not defective, do Step 4.
- b. If defective, repair or replace fuel injector pump(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 7. Check for defective cylinder head gasket (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If cylinder head gasket is not defective, do Step 5.
- b. If defective, replace cylinder head gasket (TM 9-2815-252-24).

TEST OR INSPECTION

Step 8. Check for valves stuck or burnt (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If valves are not stuck or burnt, do Step 6.
- b. If defective, replace valves (TM 9-2815-252-24).

TEST OR INSPECTION

Step 9. Check for low engine vacuum (TM 9-2815-252-24).

CORRECTIVE ACTION

If engine vacuum is too low, repair or replace engine (TM 9-2815-252-24).

SYMPTOM

5. ENGINE MISFIRING.

TEST OR INSPECTION

Step 1. Check for contaminated or incorrect grade of fuel.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If fuel is not contaminated and is correct grade, do Step 2.
- b. If contaminated or incorrect grade, drain engine fuel system and service fuel filter/water separator (WP 0089). Drain generator set tank. Service generator set tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Check for air in fuel lines.

CORRECTIVE ACTION

- a. If air in lines, bleed fuel lines (TM 9-2815-252-24).
- b. If no air in fuel lines and trouble persists, notify next higher level of maintenance.

TEST OR INSPECTION

Step 3. Test for defective fuel injection nozzle(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection nozzle(s) is not defective, do Step 2.
- b. If defective, repair or replace fuel injection nozzle(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 4. Check fuel injection pump(s) timing (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection pump(s) timing is correct, do Step 3.
- b. If not correctly timed, time fuel injection pump(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 5. Test for defective fuel injection pump(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection pump(s) is not defective, do Step 4.
- b. If defective, repair or replace fuel injector pump(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 6. Check for weak valve springs (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If valve springs are serviceable, do Step 5.
- b. If defective, replace valve springs (TM 9-2815-252-24).

TEST OR INSPECTION

Step 7. Check for valves stuck or burnt (TM 9-2815-252-24).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If valves are not stuck or burnt, do Step 6.
- b. If defective, replace valves (TM 9-2815-252-24).

TEST OR INSPECTION

Step 8. Check for low engine vacuum (TM 9-2815-252-24).

CORRECTIVE ACTION

If engine vacuum is too low, repair or replace engine (TM 9-2815-252-24).

SYMPTOM

6. ENGINE DOES NOT DEVELOP FULL POWER.

TEST OR INSPECTION

Step 1. Check for restricted fuel filter/water separator.

CORRECTIVE ACTION

- a. If fuel filter/water separator is not restricted, do Step 2.
- b. If restricted, replace fuel filter/water separator element (WP 0089).

TEST OR INSPECTION

Step 2. Check for contaminated or incorrect grade of fuel.

CORRECTIVE ACTION

- a. If fuel is not contaminated and is correct grade, do Step 3.
- b. If contaminated or incorrect grade, drain engine fuel system and service fuel filter/water separator (WP 0089). Drain generator set tank. Service generator set tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check for blocked air intake system.

CORRECTIVE ACTION

- a. If air intake system is not blocked, do Step 4.
- b. If blocked, unblock or replace air intake system components as required (WP 0068, WP 0069, and WP 0070).

TEST OR INSPECTION

Step 4. Check blocked exhaust pipe or muffler.

CORRECTIVE ACTION

- a. If blocked, unblock or replace exhaust pipe/muffler (WP 0067).
- b. If not blocked and trouble persists, notify next higher level of maintenance.

TROUBLESHOOTING PROCEDURES – CONTINUED**TEST OR INSPECTION**

Step 5. Test for defective fuel injection nozzle(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection nozzle(s) is not defective, do Step 2.
- b. If defective, repair or replace fuel injection nozzle(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 6. Check fuel injection pump(s) timing (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection pump(s) timing is correct, do Step 3.
- b. If not correctly timed, time fuel injection pump(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 7. Check for weak valve springs (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If valve springs are serviceable, do Step 4.
- b. If defective, replace valve springs (TM 9-2815-252-24).

TEST OR INSPECTION

Step 8. Check for valves stuck or burnt (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If valves are not stuck or burnt, do Step 5.
- b. If defective, replace valves (TM 9-2815-252-24).

TEST OR INSPECTION

Step 9. Check for defective cylinder head gasket (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If cylinder head gasket is not defective, do Step 6.
- b. If defective, replace cylinder head gasket (TM 9-2815-252-24).

TEST OR INSPECTION

Step 10. Check for low engine vacuum (TM 9-2815-252-24).

CORRECTIVE ACTION

If engine vacuum is too low, repair or replace engine(TM 9-2815-252-24).

SYMPTOM

7. ENGINE KNOCKS.

TROUBLESHOOTING PROCEDURES – CONTINUED**TEST OR INSPECTION**

Check for contaminated or incorrect grade of fuel.

CORRECTIVE ACTION

- a. If contaminated or incorrect grade, drain engine fuel system and service fuel filter/water separator (WP 0089). Drain generator set tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).
- b. If fuel is not contaminated or incorrect grade and trouble persists, notify next higher level of maintenance.

SYMPTOM

8. BLACK OR GREY SMOKE IN EXHAUST.

TEST OR INSPECTION

Step 1. Check for improper grade of fuel.

CORRECTIVE ACTION

- a. If improper grade of fuel, drain generator set tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).
- b. If proper grade of fuel and trouble persists, notify next higher level of maintenance.

TEST OR INSPECTION

Step 2. Test for defective fuel injection nozzle(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection nozzle(s) is not defective, do Step 3.
- b. If defective, repair or replace fuel injection nozzle(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check fuel injection pump(s) timing (TM 9-2815-252-24).

CORRECTIVE ACTION

If not correctly timed, time fuel injection pump(s) (TM 9-2815-252-24).

SYMPTOM

9. BLUE OR WHITE EXHAUST SMOKE.

TEST OR INSPECTION

Step 1. Check for improper grade of fuel.

CORRECTIVE ACTION

- a. If proper grade of fuel, do Step 2.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If improper grade of fuel, drain generator set tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Check for defective thermostat (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If defective, replace thermostat (TM 9-2815-252-24).
- b. If thermostat is not defective and trouble persists, notify next higher level of maintenance.

TEST OR INSPECTION

Step 3. Test for defective fuel injection nozzle(s) (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If fuel injection nozzle(s) is not defective, do Step 4.
- b. If defective, repair or replace fuel injection nozzle(s) (TM 9-2815-252-24).

TEST OR INSPECTION

Step 4. Check fuel injection pump(s) timing (TM 9-2815-252-24).

CORRECTIVE ACTION

If not correctly timed, time fuel injection pump(s) (TM 9-2815-252-24).

SYMPTOM

10. HIGH OIL CONSUMPTION.

TEST OR INSPECTION

Step 1. Check for blocked air intake system.

CORRECTIVE ACTION

- a. If air intake system is not blocked, do Step 2.
- b. If blocked, unblock or replace air intake system components as required (WP 0068, WP 0069, and WP 0070).

TEST OR INSPECTION

Step 2. Check for improper lubrication oil.

CORRECTIVE ACTION

- a. If improper, drain crankcase and refill with proper lubrication oil (WP 0006, Table 3 and WP 0006, Lubricating Oil). Replace oil filter (TM 9-2815-252-24).
- b. If proper lubrication oil and trouble persists, notify next higher level of maintenance.

TROUBLESHOOTING PROCEDURES – CONTINUED**SYMPTOM**

11. LOW OIL PRESSURE.

TEST OR INSPECTION

Step 1. Check for improper lubrication oil.

CORRECTIVE ACTION

- a. If proper lubrication oil, do Step 2.
- b. If improper, drain oil and refill with proper lubrication oil (WP 0006, Table 3 and WP 0006, Lubricating Oil). Replace oil filter (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Test for defective OIL PRESSURE indicator (M7) (WP 0040, Testing).

CORRECTIVE ACTION

- a. If OIL PRESSURE indicator is not defective, do Step 3.
- b. If defective, replace OIL PRESSURE indicator (WP 0040).

TEST OR INSPECTION

Step 3. Test for defective oil pressure sender (MT7) (WP 0093, Testing).

CORRECTIVE ACTION

- a. If defective, replace oil pressure sender (WP 0093).
- b. If oil pressure sender is not defective and trouble persists, notify next higher level of maintenance.

SYMPTOM

12. HIGH OIL PRESSURE.

TEST OR INSPECTION

Step 1. Check for improper lubrication oil.

CORRECTIVE ACTION

- a. If proper lubrication oil, do Step 2.
- b. If improper, drain oil and refill with proper lubrication oil (WP 0006, Table 3 and WP 0006, Lubricating Oil). Replace oil filter (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Test for defective OIL PRESSURE indicator (WP 0040, Testing).

CORRECTIVE ACTION

- a. If OIL PRESSURE indicator is not defective, do Step 3.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If defective, replace OIL PRESSURE indicator (WP 0040).

TEST OR INSPECTION

Step 3. Test for defective oil pressure sender (WP 0093, Testing).

CORRECTIVE ACTION

- a. If defective, replace oil pressure sender (WP 0093).
- b. If not defective and trouble persists, notify next higher level of maintenance.

SYMPTOM

13. ENGINE OVERHEATING.

TEST OR INSPECTION

Step 1. Check for broken or loose fan belt (WP 0077, Inspection).

CORRECTIVE ACTION

- a. If fan belt is not broken and tension is correct, do Step 2.
- b. If worn or broken, replace fan belt (WP 0077, Replacement). If loose, adjust fan belt (WP 0077, Adjustment).

TEST OR INSPECTION

Step 2. Check for clogged radiator (WP 0072, Inspection).

CORRECTIVE ACTION

- a. If radiator is not clogged, do Step 3.
- b. If clogged, service radiator (WP 0071, Service, and WP 0072).

TEST OR INSPECTION

Step 3. Test for defective radiator cap (WP 0071, Testing).

CORRECTIVE ACTION

- a. If radiator cap is not defective, do Step 4.
- b. If defective, replace radiator cap (WP 0072).

TEST OR INSPECTION

Step 4. Test for defective thermostat (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If thermostat is not defective, do Step 5.
- b. If defective, replace thermostat (TM 9-2815-252-24).

TEST OR INSPECTION

Step 5. Check for defective coolant hose(s).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If coolant hoses are not leaking or collapsed, do Step 6.
- b. If defective, replace coolant hose(s) (WP 0073 and WP 0074).

TEST OR INSPECTION

Step 6. Check for defective water pump (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If defective, replace water pump (TM 9-2815-252-24).
- b. If water pump is not defective and trouble persists, notify next higher level of maintenance.

SYMPTOM

14. ENGINE COOLANT TEMPERATURE TOO LOW.

TEST OR INSPECTION

Step 1. Check for defective thermostat (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If thermostat is not defective, do Step 2.
- b. If defective, replace thermostat (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Test for defective coolant temperature sender (MT6) (WP 0094, Testing).

CORRECTIVE ACTION

- a. If coolant temperature sender is not defective, do Step 3.
- b. If defective, replace coolant temperature sender (WP 0094).

TEST OR INSPECTION

Step 3. Test for defective COOLANT TEMP indicator (M6) (WP 0039, Testing).

CORRECTIVE ACTION

- a. If defective, replace COOLANT TEMP indicator (WP 0039).
- b. If COOLANT TEMP indicator is not defective and trouble persists, notify next higher level of maintenance.

SYMPTOM

15. EXCESSIVE FUEL CONSUMPTION.

TEST OR INSPECTION

Step 1. Check for blocked air intake system.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If air intake system is not blocked, do Step 2.
- b. If blocked, unblock or replace air intake system components as required (WP 0068, WP 0069, and WP 0070).

TEST OR INSPECTION

Step 2. Check for leaks in fuel system.

CORRECTIVE ACTION

- a. If no leaks in fuel system, do Step 3.
- b. If leaks are found, repair fuel system as required.

TEST OR INSPECTION

Step 3. Check for contaminated oil.

CORRECTIVE ACTION

- a. If oil is contaminated, change the oil (WP 0006, Table 3 and WP 0006, Lubricating Oil).
- b. If oil is not contaminated or trouble persists, notify next higher level of maintenance.

SYMPTOM

16. COOLANT IN CRANKCASE OR OIL IN COOLANT.

TEST OR INSPECTION

Step 1. Check for coolant or oil contamination.

CORRECTIVE ACTION

If contaminated, notify next higher level of maintenance.

TEST OR INSPECTION

Step 2. Check for cracked cylinder head (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If cylinder head is not cracked, do Step 3.
- b. If cracked, replace cylinder head (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check for defective cylinder head gasket (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If defective, replace cylinder head gasket (TM 9-2815-252-24).
- b. If not defective and problem persists, replace engine (TM 9-2815-252-24).

TROUBLESHOOTING PROCEDURES – CONTINUED**SYMPTOM**

17. ENGINE VIBRATING.

TEST OR INSPECTION

Step 1. Check for bent or broken cooling fan blades (WP 0076, Inspection).

CORRECTIVE ACTION

- a. If fan blades are not damaged, do Step 2.
- b. If damaged, replace cooling fan (WP 0076).

TEST OR INSPECTION

Step 2. Check for contaminated or incorrect grade of fuel.

CORRECTIVE ACTION

- a. If fuel is not contaminated and is correct grade, do Step 3.
- b. If contaminated or incorrect grade, drain engine fuel system and service fuel filter/water separator (WP 0089). Drain generator set fuel tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check for loose or defective engine mounts.

CORRECTIVE ACTION

- a. Tighten loose mounting bolts.
- b. If bolts are tight and problem persists, notify next higher level of maintenance.

SYMPTOM

18. ENGINE FAILS TO START IN COLD WEATHER.

TEST OR INSPECTION

Step 1. Test for low or no battery charge (WP 0010, Testing).

CORRECTIVE ACTION

- a. If batteries are fully charged, do Step 2.
- b. If not fully charged, replace batteries (WP 0010).

TEST OR INSPECTION

Step 2. Check for improper lubrication oil.

CORRECTIVE ACTION

- a. If proper lubrication oil, do Step 3.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If improper, drain crankcase and refill with proper lubrication oil (WP 0006, Table 3). Replace oil filter (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check for improper grade of fuel.

CORRECTIVE ACTION

- a. If proper grade of fuel, do Step 4.
- b. If improper grade of fuel, drain generator set tank. Service generator set fuel tank with clean fuel of a proper grade (WP 0006, Table 2). Prime engine fuel system (TM 9-2815-252-24).

TEST OR INSPECTION

Step 4. Check for defective inlet manifold heater plugs (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If heater plugs are not defective, do Step 5.
- b. If defective, replace heater plugs (TM 9-2815-252-24).

TEST OR INSPECTION

Step 5. Test for defective MASTER SWITCH (WP 0046, Testing).

CORRECTIVE ACTION

- a. If MASTER SWITCH is not defective, do Step 6.
- b. If defective, replace MASTER SWITCH (WP 0046).

TEST OR INSPECTION

Step 6. Test for defective PRE-HEAT RELAY (K18) (WP 0061, Testing).

CORRECTIVE ACTION

- a. If defective, replace PRE-HEAT RELAY (WP 0061).
- b. If PRE-HEAT RELAY is not defective and problem persists, go to symptom 2 (Engine Cranks but Fails to Start).

SYMPTOM

19. ABNORMAL ENGINE NOISE.

TEST OR INSPECTION

Step 1. Check for worn rocker arm shaft (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If rocker arm shaft is not worn, do Step 2.
- b. If worn, replace rocker arm shaft (TM 9-2815-252-24).

TROUBLESHOOTING PROCEDURES – CONTINUED**TEST OR INSPECTION**

Step 2. Check for bent push rods.

CORRECTIVE ACTION

- a. If push rods are not bent, do Step 3.
- b. If bent, replace push rods (TM 9-2815-252-24).

TEST OR INSPECTION

Step 3. Check for worn timing gears.

CORRECTIVE ACTION

- a. If timing gears are not worn, do Step 4.
- b. If worn, replace timing gears (TM 9-2815-252-24).

TEST OR INSPECTION

Step 4. Check for foreign material in combustion chamber (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If foreign material is found, clean combustion chamber (TM 9-2815-252-24).
- b. If no foreign matter is found and problem persists, replace engine (TM 9-2815-252-24).

SYMPTOM

20. BATTERY CHARGE AMMETER SHOWS NO CHARGE WHEN BATTERIES ARE LOW OR DISCHARGED.

TEST OR INSPECTION

Step 1. Check for broken or loose fan belt (WP 0077, Inspection).

CORRECTIVE ACTION

- a. If fan belt is not broken and tension is correct, do Step 2.
- b. If worn or broken, replace fan belt (WP 0077). If loose, adjust fan belt (WP 0077, Adjustment).

TEST OR INSPECTION

Step 2. Check for defective BATTERY CHARGER FUSE (FU1) (WP 0023, Test).

CORRECTIVE ACTION

- a. If BATTERY CHARGER FUSE is not blown, do Step 3.
- b. If defective, replace BATTERY CHARGER FUSE (WP 0023).

TEST OR INSPECTION

Step 3. Test for battery voltage between negative and EXC terminal of alternator with MASTER SWITCH in the PRIME/RUN position.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If battery voltage is present, do Step 4.
- b. If battery voltage is not present, do Step 7.

TEST OR INSPECTION

Step 4. Test for defective battery charging alternator (G2) (WP 0012, Testing).

CORRECTIVE ACTION

- a. If battery charging alternator is not defective, do Step 5.
- b. If defective, replace battery charging alternator (WP 0012).

TEST OR INSPECTION

Step 5. Test for defective battery charging ammeter shunt (MT4) (WP 0027, Testing).

CORRECTIVE ACTION

- a. If battery charging ammeter shunt is not defective, do Step 6.
- b. If defective, replace battery charging ammeter shunt (WP 0027).

TEST OR INSPECTION

Step 6. Test for defective BATTERY CHARGE ammeter (M4) (WP 0042, Testing).

CORRECTIVE ACTION

- a. If BATTERY CHARGE ammeter is not defective, do Step 7.
- b. If defective, replace BATTERY CHARGE ammeter (WP 0042).

TEST OR INSPECTION

Step 7. Check for breaks or loose connections in charging circuit, refer to FO-2.

CORRECTIVE ACTION

If breaks or loose connections are found, repair charging circuit.

SYMPTOM

21. BATTERY CHARGE AMMETER SHOWS EXCESSIVE CHARGING AFTER PROLONGED OPERATION.

TEST OR INSPECTION

Step 1. Test for defective batteries (WP 0010, Testing).

CORRECTIVE ACTION

- a. If batteries are not defective, do Step 2.
- b. If defective, replace batteries (WP 0010).

TROUBLESHOOTING PROCEDURES – CONTINUED**TEST OR INSPECTION**

Step 2. Test for defective BATTERY CHARGE ammeter (WP 0042, Testing).

CORRECTIVE ACTION

- a. If BATTERY CHARGE ammeter is not defective, do Step 3.
- b. If defective, replace BATTERY CHARGE ammeter (WP 0042).

TEST OR INSPECTION

Step 3. Test for defective battery charging alternator (WP 0012, Testing).

CORRECTIVE ACTION

- a. If battery charging alternator is not defective, do Step 4.
- b. If defective, replace battery charging alternator (WP 0012).

TEST OR INSPECTION

Step 4. Check for short in charging circuit, refer to FO-2.

CORRECTIVE ACTION

If shorted, repair charging circuit.

SYMPTOM

22. AC VOLTMETER (VOLTS AC) DOES NOT INDICATE VOLTAGE.

TEST OR INSPECTION

Step 1. Test for defective AC voltmeter (VOLTS AC) (M1) (WP 0045, Testing).

CORRECTIVE ACTION

- a. If AC voltmeter (VOLTS AC) is not defective, do Step 2.
- b. If defective, replace AC voltmeter (VOLTS AC) (WP 0045).

TEST OR INSPECTION

Step 2. Test for defective VM-AM transfer switch (S6) (WP 0051, Testing).

CORRECTIVE ACTION

- a. If VM-AM transfer switch is not defective, do Step 3.
- b. If defective, replace VM-AM transfer switch (WP 0051).

TEST OR INSPECTION

Step 3. Test for defective VOLTAGE adjust potentiometer (R1) (WP 0047, Testing).

CORRECTIVE ACTION

- a. If VOLTAGE adjust potentiometer is not defective, do Step 4.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If defective, replace VOLTAGE adjust potentiometer (WP 0047).

TEST OR INSPECTION

Step 4. Test for defective AC voltage regulator (A1) (WP 0025, Testing).

CORRECTIVE ACTION

- a. If AC voltage regulator is not defective, do Step 5.
- b. If defective, replace AC voltage regulator (WP 0025).

TEST OR INSPECTION

Step 5. Test for defective voltage reconnection switch (S8) (WP 0066, Testing).

CORRECTIVE ACTION

- a. If voltage reconnection switch is not defective, do Step 6.
- b. If defective, replace voltage reconnection switch (WP 0066).

TEST OR INSPECTION

Step 6. Check AC voltmeter circuit for breaks or loose connections, refer to FO-2.

CORRECTIVE ACTION

If breaks or loose connections are found, repair AC voltmeter circuit.

SYMPTOM

23. GENERATOR SET FAILS TO GENERATE POWER.

TEST OR INSPECTION

Step 1. Test for defective AC circuit interrupter relay (K1) (WP 0063, Testing).

CORRECTIVE ACTION

- a. If AC circuit interrupter relay is not defective, do Step 2.
- b. If defective, replace AC circuit interrupter relay (WP 0063).

TEST OR INSPECTION

Step 2. Test for defective field flash relay (K15) (WP 0031, Testing).

CORRECTIVE ACTION

- a. If defective, replace field flash relay (WP 0031).
- b. If field flash relay is not defective and trouble persists, notify next higher level of maintenance.

TEST OR INSPECTION

Step 3. Test for open circuit in generator exciter field (WP 0106, Testing Brushless Exciter Stator).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If exciter stator is not open, do Step 2.
- b. If open, replace exciter stator (WP 0107, MEP-802A), (WP 0108, MEP-812A).

TEST OR INSPECTION

Step 4. Test for defective generator stator windings (WP 0106, Testing Generator Stator).

CORRECTIVE ACTION

- a. If generator stator is not defective, do Step 3.
- b. If defective, replace generator stator (WP 0107, MEP-802A), (WP 0108, MEP-812A).

TEST OR INSPECTION

Step 5. Test for defective generator rotating rectifiers (WP 0106, Testing Rotating Rectifiers).

CORRECTIVE ACTION

- a. If rectifiers are not defective, do Step 4.
- b. If defective, replace generator rotating rectifiers (WP 0107, MEP-802A), (WP 0108, MEP-812A).

TEST OR INSPECTION

Step 6. Test for open circuit in generator rotor (WP 0106, Testing Generator Rotor).

CORRECTIVE ACTION

- a. If generator rotor is not open, do Step 5.
- b. If open, replace generator rotor (WP 0107, MEP-802A), (WP 0108, MEP-812A).

TEST OR INSPECTION

Step 7. Test for shorted generator exciter armature (WP 0106, Testing Brushless Exciter Rotor (Armature)).

CORRECTIVE ACTION

If generator exciter rotor is shorted, replace exciter (WP 0107, MEP-802A), (WP 0108, MEP-812A).

SYMPTOM

24. AC VOLTMETER (VOLTS AC) INDICATES VOLTAGE, BUT FREQUENCY METER (HERTZ) IS OFF SCALE.

TEST OR INSPECTION

Step 1. Check for defective frequency adjust control cable (WP 0091, Inspection).

CORRECTIVE ACTION

- a. If frequency adjust control cable is not defective, do Step 2.

TROUBLESHOOTING PROCEDURES – CONTINUED

- b. If defective, replace frequency adjust control cable (WP 0091).

TEST OR INSPECTION

Step 2. Test for defective FREQUENCY meter (HERTZ) (M2) (WP 0043, Testing).

CORRECTIVE ACTION

- a. If FREQUENCY meter (HERTZ) is not defective, do Step 3.
- b. If defective, replace FREQUENCY meter (HERTZ) (WP 0043).

TEST OR INSPECTION

Step 3. Test for defective frequency transducer (A7) (WP 0026, Testing).

CORRECTIVE ACTION

- a. If frequency transducer is not defective, do Step 4.
- b. If defective, replace frequency transducer (WP 0026).

TEST OR INSPECTION

Step 4. Check frequency meter circuit for breaks or loose connections, refer to FO-2.

CORRECTIVE ACTION

If breaks or loose connections are found, repair frequency meter circuit.

SYMPTOM

25. AC VOLTMETER (VOLTS AC) VOLTAGE FLUCTUATES.

TEST OR INSPECTION

Step 1. Check for loose electrical connections, refer to FO-2.

CORRECTIVE ACTION

- a. If no loose connections, do Step 2.
- b. If loose, tighten electrical connections.

TEST OR INSPECTION

Step 2. Test for defective AC voltmeter (VOLTS AC) (WP 0045, Testing).

CORRECTIVE ACTION

- a. If AC voltmeter (VOLTS AC) is not defective, do Step 3.
- b. If defective, replace AC voltmeter (VOLTS AC) (WP 0045).

TEST OR INSPECTION

Step 3. Test for defective VOLTAGE adjust potentiometer (WP 0047, Testing).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If VOLTAGE adjust potentiometer is not defective, do Step 4.
- b. If defective, replace VOLTAGE adjust potentiometer (WP 0047).

TEST OR INSPECTION

Step 4. Test for defective AC voltage regulator (WP 0025, Testing).

CORRECTIVE ACTION

- a. If AC voltage regulator is not defective, do Step 5.
- b. If defective, replace AC voltage regulator (WP 0025).

TEST OR INSPECTION

Step 5. Test for defective VM-AM transfer switch (WP 0051, Testing).

CORRECTIVE ACTION

- a. If VM-AM transfer switch is not defective, do Step 6.
- b. If defective, replace VM-AM transfer switch (WP 0051).

TEST OR INSPECTION

Step 6. Check AC voltmeter circuit for breaks or loose connections, refer to FO-2.

CORRECTIVE ACTION

If breaks or loose connections are found, repair AC voltmeter circuit.

SYMPTOM

26. FREQUENCY METER (HERTZ) FREQUENCY FLUCTUATES.

TEST OR INSPECTION

Step 1. Check for erratic engine operation, refer to symptom 4 (Engine Runs Erratically or Stalls Frequently).

CORRECTIVE ACTION

If engine is operating properly, do Step 2.

TEST OR INSPECTION

Step 2. Test for defective FREQUENCY meter (HERTZ) (WP 0043, Testing).

CORRECTIVE ACTION

- a. If FREQUENCY meter (HERTZ) is not defective, do Step 3.
- b. If defective, replace FREQUENCY meter (HERTZ) (WP 0043).

TEST OR INSPECTION

Step 3. Test for defective frequency transducer (WP 0026, Testing).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If frequency transducer is not defective, do Step 4.
- b. If defective, replace frequency transducer (WP 0026).

TEST OR INSPECTION

Step 4. Check for defective frequency adjust control cable (WP 0091, Inspection).

CORRECTIVE ACTION

- a. If defective, replace or adjust frequency adjust control cable (WP 0091).
- b. If frequency adjust control cable is adjusted correctly and not defective and trouble persists, notify next higher level of maintenance.

SYMPTOM

27. GENERATOR SET FAILS TO GENERATE SUFFICIENT VOLTAGE.

TEST OR INSPECTION

Step 1. Check for low engine speed (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If engine is operating correctly, do Step 2.
- b. If defective, repair engine (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Test for shorted generator stator (WP 0106, Testing Generator Stator).

CORRECTIVE ACTION

If generator stator is shorted, replace generator stator (WP 0107, MEP-802A), (WP 0108, MEP-812A).

SYMPTOM

28. GENERATOR SET OUTPUT FLUCTUATES.

TEST OR INSPECTION

Step 1. Check for irregular engine speed (TM 9-2815-252-24).

CORRECTIVE ACTION

- a. If engine is operating properly, do Step 2.
- b. If defective, repair engine (TM 9-2815-252-24).

TEST OR INSPECTION

Step 2. Test for short in generator exciter stator (WP 0106, Testing Brushless Exciter Stator).

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

If exciter stator is shorted, replace exciter stator (WP 0107, MEP-802A), (WP 0108, MEP-812A).

SYMPTOM

29. GENERATOR NOISY WHEN RUNNING.

TEST OR INSPECTION

Step 1. Check for defective generator main bearing (WP 0107, MEP-802A), (WP 0108, MEP-812A).

CORRECTIVE ACTION

- a. If generator main bearing is not defective, do Step 2.
- b. If defective, replace main bearing (WP 0107, MEP-802A), (WP 0108, MEP-812A).

TEST OR INSPECTION

Step 2. Check for heat causing loose laminations.

CORRECTIVE ACTION

- a. If generator laminations are not loose, do Step 3.
- b. If defective, replace part(s) (WP 0107, MEP-802A), (WP 0108, MEP-812A).

TEST OR INSPECTION

Step 3. Inspect for loose engine/generator coupling.

CORRECTIVE ACTION

- a. If there are no loose or missing engine/generator coupling bolts, do Step 4.
- b. If loose, tighten or install engine/generator coupling bolts (WP 0107, MEP-802A, Assembly/Installation) (WP 0108, MEP-812A, Installation).

TEST OR INSPECTION

Step 4. Test for defective generator.

CORRECTIVE ACTION

If defective, replace generator (WP 0107, MEP-802A), (WP 0108, MEP-812A).

SYMPTOM

30. NO VOLTAGE AT CONVENIENCE RECEPTACLE.

TEST OR INSPECTION

Step 1. Open control panel and inspect circuit interrupter on side of GROUND FAULT CIRCUIT INTERRUPTER.

TROUBLESHOOTING PROCEDURES – CONTINUED**CORRECTIVE ACTION**

- a. If device is tripped, reset device for generator sets contract number DAAK01-94-D-0036.
- b. For generator sets contract number DAAK01-88-D-0080, check in-line fuse on black lead of GROUND FAULT CIRCUIT INTERRUPTER.
- c. If device is not tripped, do Step 2.

TEST OR INSPECTION

Step 2. Check GROUND FAULT CIRCUIT INTERRUPTER.

CORRECTIVE ACTION

- a. If indicator is tripped, reset by pressing RESET button.
- b. If Indicator is not tripped, do Step 3.

TEST OR INSPECTION

Step 3. Check voltage across CONVENIENCE RECEPTACLE.

CORRECTIVE ACTION

- a. If voltage is present, replace CONVENIENCE RECEPTACLE.
- b. If voltage is not present, do Step 4.

TEST OR INSPECTION

Step 4. Check voltage across terminals 4 and 6 on TB-5.

CORRECTIVE ACTION

- a. If voltage is present, replace GROUND FAULT CIRCUIT INTERRUPTER.
- b. If voltage is not present, search for loose or broken wires or loose pin in connectors.

END OF WORK PACKAGE

CHAPTER 3

FIELD MAINTENANCE INSTRUCTIONS

FIELD MAINTENANCE

SERVICE UPON RECEIPT

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Assistanct (1)

Materials/Parts

Safety Goggles, Chemical Gloves & Protective Cloth-

ing
Suitable Container for oil drainage

Corrosion Inhibitor MIL-A-53009A(1)

Antifreeze A-A-52624A

DIESEL FUEL: A-A-52557A (Grade 2-D); MIL-
DTL-83133E (JP-8); A-A-52557A (Grade 1-D) &
MIL-DTL-5624T (JP-5)LUBRICATING OIL: MIL-PRF-2104H; OE HDO-30 or
OE HDO-15/40; OE HDO-10 & MIL-PRF-46167C;**References**

TM-9-6140-200-14

Radiator Drain Valve (WP 0002)

Fan Belt (WP 0077)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

Generator Set Grounded

SERVICE UPON RECEIPT OF MATERIEL

This section provides information and guidance for inspecting, servicing, and installing the generator set under normal conditions.

INSPECTION

1. Unpack and inventory all end item components for serviceability.
2. Check that all packing materials have been removed.
3. Check generator set identification plate for proper identification.
4. Inspect generator set for any internal or exterior shipping damage.
5. Open engine compartment access doors and inspect batteries for damage.
6. Check battery cables for proper polarity connection, damage, and loose connections.
7. Open control panel access door and check panel for damage.
8. Lower control panel and check electrical components for damage or loose connections.
9. Raise control panel and secure fasteners.
10. Check air cleaner assembly for external damage and exhaust opening for obstruction.
11. Ensure fan belt is not frayed or cracked (WP 0077, Inspection). Check fan drive belt for proper adjustment (WP 0077, Adjustment).
12. Inspect generator set for loose or missing mounting hardware or damaged or missing parts.
13. Drain preservative from engine and fill with proper lubricating oil (Table 3) (Lubricating Oil), as required. Ensure that oil level is at FULL mark on dipstick.

INSPECTION – CONTINUED

14. Unpack grounding rod and auxiliary fuel hose. Inspect each item for damage and accountability.

SERVICE**Batteries.****WARNING**

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Battery acid can cause burns to unprotected skin. Wear safety goggles and chemical gloves and avoid acid splash while working on batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

When servicing batteries, refer to TM 9-6140-200-14.

Radiator.**WARNING**

Do not operate generator set while servicing radiator. Failure to comply with this warning can cause injury to personnel and damage to the equipment.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

SERVICE – CONTINUED**WARNING**

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply with this warning can cause injury to personnel.

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Remove radiator cap.
2. Check that radiator drain valve is closed (WP 0002, Figure 1).
3. Fill radiator with proper coolant/antifreeze (Table 1). Fill radiator to a level 2 in below filler neck opening. Cooling system capacity is 6.2 quarts (5.9 L).
4. Remove overflow bottle cap.
5. Fill overflow bottle to COLD level.
6. Install overflow bottle and radiator caps.
7. Start generator set. After 30 minutes of operation, shutdown generator set and check coolant/antifreeze level at overflow bottle. Add coolant/antifreeze (Table 1) to overflow bottle to HOT level in overflow bottle.

Table 1. Coolant.

AMBIENT TEMPERATURE	RADIATOR COOLANT	RATIO
40 to 120 °F (4 to 49 °C)	Water: MIL-A-53009A(1) Inhibitor, Corrosion	35:1
-25 to 120 °F (-32 to 49 °C)	Water: A-A-52624A Antifreeze	1:1
-25 to 120 °F (-32 to 49 °C)	A-A-52624A Antifreeze	N/A

SERVICE – CONTINUED**Fuel Tank.****WARNING**

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

1. Check that fuel drain valve is closed (WP 0002, Figure 1).
2. Remove fuel tank filler cap.
3. Fill fuel tank with specified fuel type (Table 2). Fuel tank capacity is 7.3 gals (18.9 L).
4. Install fuel tank filler cap.

Table 2. Fuel.

AMBIENT TEMPERATURE	DIESEL FUEL
20 to 120 °F (-7 to 49 °C)	A-A-52557A, Grade 2-D MIL-DTL-83133E, JP-8
-25 to 20 °F	A-A-52557A, Grade 1-D MIL-DTL-5624T, JP-5

Lubricating Oil.

1. Place suitable container under oil drain plug and remove plug.

WARNING

Oil filter base and housing springs are under tension and can act as projectiles when being removed. Use eye protection when removing springs. Failure to comply with this warning can cause injury to personnel.

2. Open left side engine access door, open oil drain valve (WP 0002, Figure 1), and drain oil.
3. Close oil drain valve and remove oil fill cap.

NOTE

Dipstick is marked indicating that oil level can be checked and oil added when engine is running or stopped. Make sure the correct side of dipstick is checked.

4. Fill engine with proper engine lubricating oil (Table 3) to FULL mark on dipstick. Lubrication system capacity is 3.2 quarts (3.0 L).

WARNING

The high pressure oil system operates at high temperature and pressure. Contact with hot oil can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Wear heat resistant gloves and avoid contacting hot surfaces. Do not allow hot oil or components to contact skin or hands. Failure to comply with this warning can cause injury or death to personnel.

SERVICE – CONTINUED**WARNING**

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

5. Install oil fill cap. Close left side engine access door.

Table 3. Lubricating Oil.

AMBIENT TEMPERATURE	LUBRICATING OIL
-45 to 45 °F (-42.8 to 7.2 °C)	MIL-PRF 46167 OEA
-25 to 40 °F (-31.7 to 4.4 °C)	MIL-PRF 21260 OE/HDO 10
15 to 120 °F (-9.4 to 48.9 °C)	MIL-PRF 21260 OE/HDO 30
-30 to 120 °F (-34.4 to 48.9 °C)	MIL-PRF 2104H OE/HDO 5/40
0 to 120 °F (-17.8 to 48.9 °C)	MIL-PRF 2104H OE/HDO 15/40
20 to 120 °F (-6.7 to 48.9 °C)	MIL-PRF 2104H OE/HDO 40

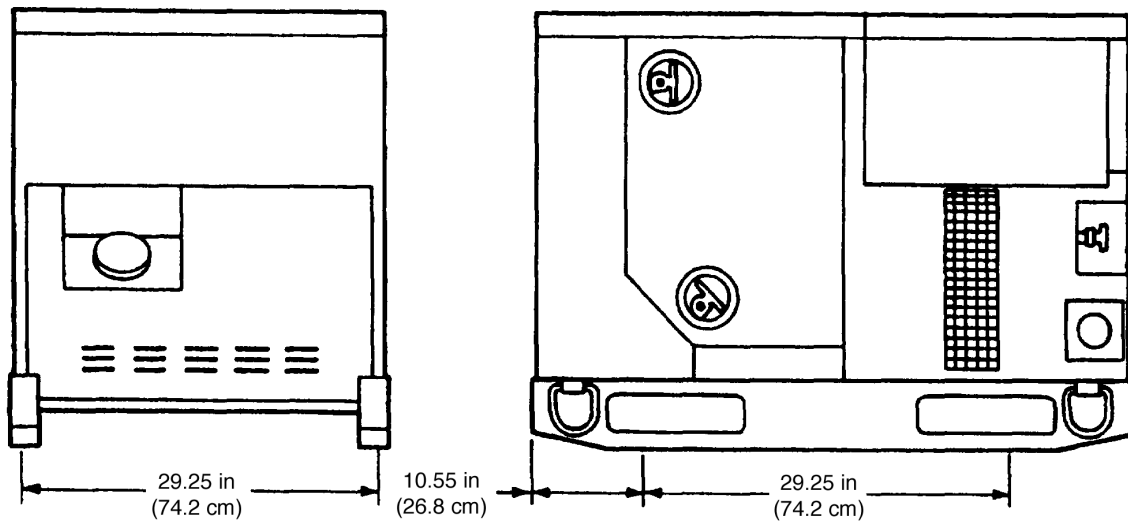
INSTALLATION INSTRUCTIONS**General****WARNING**

Exhaust discharge contains deadly gases including carbon monoxide. DO NOT operate generator set in enclosed areas unless exhaust discharge is properly vented outside. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Hot exhaust gases can ignite flammable materials. Allow room for safe discharge of hot gases and sparks. Failure to comply with this warning can cause injury or death to personnel.

1. Ensure that installation site is as level as possible.
2. Provide adequate ventilation to prevent recirculation of hot air exhausted from generator set.
3. Place generator set within 25 feet (7.4 meters) of auxiliary fuel supply.
4. Refer to Figure 1 for base mounting measurements and Figure 2 for minimum enclosure clearance measurement requirements.

INSTALLATION INSTRUCTIONS – CONTINUED**Figure 1. Base Mounting Measurements.****Outdoor Installation**

1. Make use of natural protective barriers.
2. Allow space on all sides for service and maintenance. Refer to Figure 2.
3. Ensure that site soil is firm and well drained
4. Use planks or other material for support in areas where soil will not support generator set.

Indoor Installation**WARNING**

Hot exhaust gases can ignite flammable materials. Allow room for safe discharge of hot gases and sparks. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Exhaust discharge contains deadly gases including carbon monoxide. DO NOT operate generator set in enclosed areas unless exhaust discharge is properly vented outside. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Engine exhaust fumes contain deadly poisonous gases.

Severe exposure can cause death or permanent brain damage.

Exhaust gases are most dangerous in places with poor airflow. Best defense against exhaust gas poisoning is very good airflow.

To protect yourself and your partners, always obey the following rules:

- DO NOT run engine indoors unless you have VERY GOOD AIRFLOW.

INSTALLATION INSTRUCTIONS – CONTINUED

- DO NOT idle engine for a long time unless there is VERY GOOD AIRFLOW.
- Be alert at all times. Check for smell of exhaust fumes.
- REMEMBER: Best defense against exhaust gas poisoning is VERY GOOD AIRFLOW.
- Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get ALL PERSONNEL clear of exhaust area. Make sure they have lots of fresh air. KEEP THEM WARM, CALM, AND INACTIVE. GET MEDICAL HELP. If anyone stops breathing, give artificial respiration. See FM 4-25.11 for first aid.

CAUTION

Never position generator set with the air inlets near a wall or other object that interferes with cooling air circulation. Damage to equipment could occur.

1. Provide ducts and vents to outside of building if good supply of cooling air is not available.
2. Make air intake and outlet openings in building same size or larger as those on the generator set.
3. Install a gas-tight metal pipe from exhaust pipe of generator set to outside of building.

NOTE

Make exhaust pipe extension as short and straight as possible with only one 90 degree bend, if needed.

4. Ensure that inside diameter of exhaust pipe extension is as large as or larger than generator set exhaust pipe.

WARNING

Hot exhaust gases can ignite flammable materials. Allow room for safe discharge of hot gases and sparks. Failure to comply with this warning can cause injury or death to personnel.

5. Provide for harmless discharge of hot gases and sparks. Do not direct exhaust into area containing flammable materials.

WARNING

If not shielded, hot exhaust pipe can ignite flammable wall materials. Failure to comply with this warning can cause injury or death to personnel.

6. Shield exhaust pipe with fireproof material at point where it passes through a flammable wall.

WARNING

An unwrapped exhaust pipe can cause injury if touched. Failure to comply with this warning can cause injury to personnel.

7. Wrap exhaust pipe in protective material.
8. Allow space on all sides for service and maintenance. Refer to Figure 2 for minimum clearance measurements.

INSTALLATION INSTRUCTIONS – CONTINUED

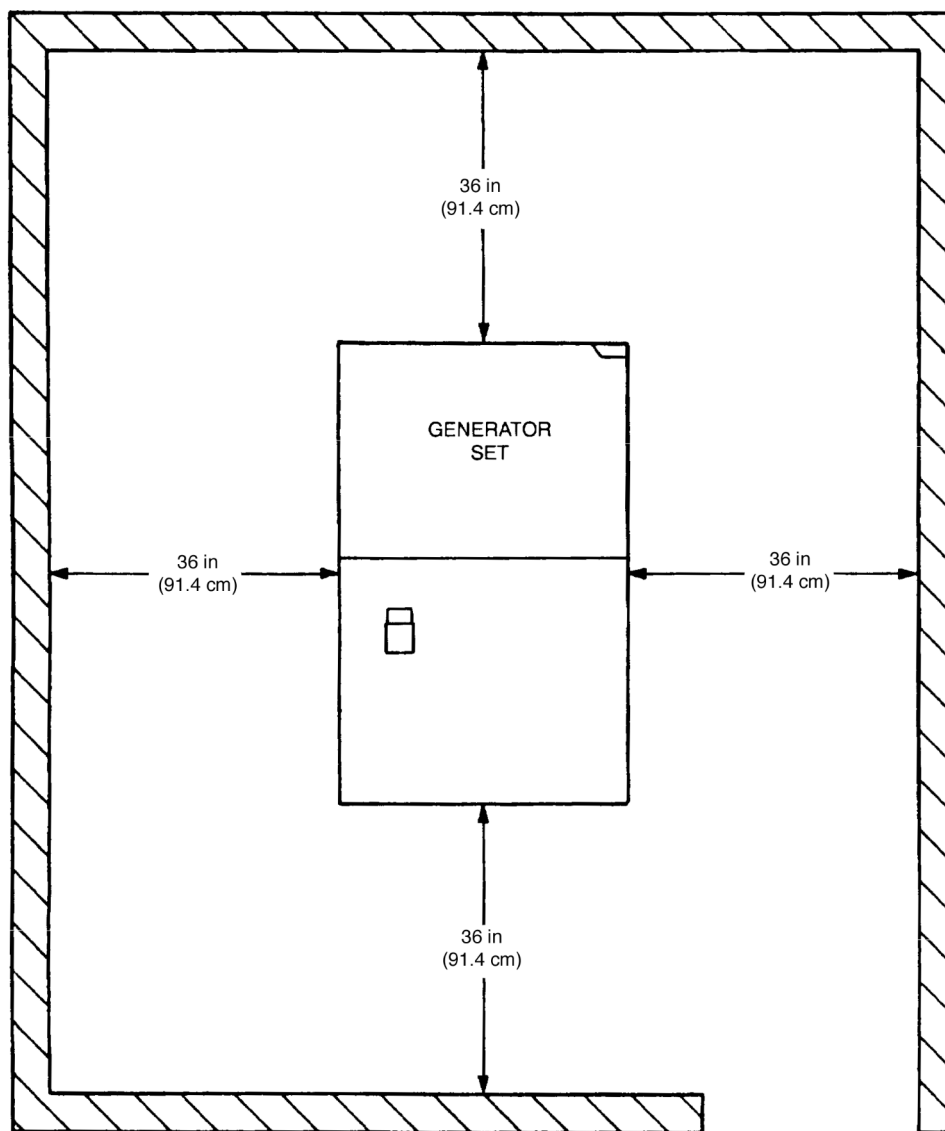


Figure 2. Minimum Enclosure Clearance Measurements.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

PMCS INTRODUCTION

INITIAL SETUP:

References

DA-FORM-2404
DA-PAM-750-8
PMCS, Including Lubrication Instructions (WP 0008)

INTRODUCTION TO FIELD PMCS TABLE

WP 0008, Table 1 (PMCS table) has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

Warnings, Cautions, and Notes

Always observe the **WARNINGS**, **CAUTIONS**, and **NOTES** appearing in your PMCS table. Warnings and cautions appear before applicable procedures. You must observe these **WARNINGS** to prevent serious injury to yourself and others. You must observe **CAUTIONS** to prevent your equipment from being damaged. You must observe **NOTES** to ensure procedures are performed properly.

Explanation of Table Entries

The PMCS table is divided into five columns. Each column is explained in the following paragraphs.

Item No. Column. Numbers in this column are for reference. When completing DA Form 2404 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

Interval Column. This column tells you when you must do the procedure in the procedure column. "Before" procedures must be done before you operate the equipment for its intended mission. "During" procedures must be done during the time you are operating the equipment for its intended mission. "After" procedures must be done immediately after you have operated the equipment, or immediately after shutting down the equipment. Perform "Weekly" procedures at the listed interval.

Item to be Checked or Serviced Column. This column lists the location and the item to be checked or serviced. The item location is underlined.

Procedure Column. This column gives the procedure for checking or servicing the item listed in the location, item to check/service column. You must perform the procedure to know if the equipment is ready or available for its intended mission or operation. You must do the procedure at the time stated in the interval column.

Equipment Not Ready/Available if: Column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make checks or services that show faults listed in this column, do not operate the equipment.

Other Table Entries

Be sure to observe all special information and notes that appear in your table.

Reporting and Correcting Deficiencies

If your generator set does not perform as required, refer to Troubleshooting for possible problems. Report any malfunctions or failures on DA Form 2404, or refer to DA Pam 750-8.

INTRODUCTION TO FIELD PMCS TABLE – CONTINUED**Special Instructions**

Preventive maintenance is not limited to performing the checks and services listed in the PMCS table. Covering unused receptacles, stowing unused accessories, and other routine procedures such as equipment inventory, cleaning components, and touch-up painting are not listed in the table. These are things you should do any time you see that they need to be done. If a routine check is listed in the PMCS table, it is because experience has shown that problems may occur with this item. Take along tools and cleaning cloths needed to perform the required checks and services. Use the information in the following paragraphs to help you identify problems at any time. Use the following information to help identify potential problems before and during checks and services.

Routine Inspections. Use the following information to help identify potential problems before and during checks and Services.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

CAUTION

Keep cleaning solvents, gasoline and lubricants away from rubber or soft plastic parts. They will deteriorate material.

1. Keep it clean. Dirt, grease, and oil get in the way and may cover up a serious problem. Use dry cleaning solvent to clean metal surfaces.
2. Use soap and water to clean rubber or plastic parts and material.
3. Check all bolts, nuts, and screws to make sure they are not loose, missing, bent, or broken. Do not try to check them with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find one loose, report it to the next higher level of maintenance.
4. Inspect welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If a broken weld is found, report it to the next higher level of maintenance.

INTRODUCTION TO FIELD PMCS TABLE – CONTINUED

5. Inspect electrical wires, connectors, terminals, and receptacles. Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure wires are in good condition. Examine terminals and receptacles for serviceability. If deficiencies are found, report them to the next higher level of maintenance.
6. Inspect hoses and fluid lines. Look for wear, damage, and leaks. Make sure that clamps and fittings are tight. Wet spots and stains around a fitting or connector can mean a leak. If a leak comes from a loose connector, or if something is broken or worn out, report it to the next higher level of maintenance.

Leakage Definitions

You must know how fluid leakage affects the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them. When in doubt, notify your supervisor.

LEAKAGE CLASS	LEAKAGE DEFINITION
Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops, but not enough to cause drops to drip from the item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

Operation of the Equipment with Minor Leaks

CAUTION

Equipment operation is allowable with minor leakage (Class I or II) of any fluid except fuel. Fluid capacity must be considered before deciding to continue operation of the equipment with minor leaks. When operating with Class I or II leaks, fluid level must be checked more often than required by the PMCS table. Parts without fluid will stop working and or cause equipment damage.

1. Consider the equipment's capacity for the fluid that is leaking. If the capacity is small, the fluid level may soon become too low for continued operation. If in doubt, *notify your supervisor*.
2. Check the fluid level more often than required in the PMCS table. Add fluid as needed.

Corrosion Prevention and Control (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

END OF WORK PACKAGE

FIELD MAINTENANCE
PMCS, INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

References

TM-9-2815-252-24
 LO-9-6115-641-12

References - cont'd

Batteries (WP 0010)
 Coolant System (WP 0071)
 Radiator (WP 0072)
 Fuel Filter/Water Separator Element (WP 0089)
 Magnetic Pickup (WP 0096)

Equipment Condition

Grounded, Off & Operational

Table 1. Field Preventive Maintenance Checks and Services.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Semi-annually	250	Engine Lube Oil	NOTE Oil filter should be changed with lube oil change (TM 9-2815-252-24). Drain engine lube oil. Add proper lube oil (LO 9-6115-641-12).	
2	Annually	250	Fuel Filter/Water Separator	Change fuel filter/water separator (WP 0089).	
3	Bi-annually	1500	Cooling System	Drain coolant and flush cooling system or add proper coolant (WP 0071, Service).	
4	Annually		Radiator Cap	Inspect radiator cap for corrosion, torn or deteriorated seal, and obvious damage.	Radiator cap or seal is damaged.
5	Annually	250	Batteries	Remove batteries (WP 0010, Removal). Clean batteries, cable terminals, and battery posts; test batteries for state of charge (WP 0010, Testing).	Batteries will not hold charge.
6	Annually	250	Air Cleaner Assembly	Inspect air cleaner assembly and mounting bracket for cracks, dents, and other damage. Inspect element for clogs and damage. Clean or replace, as necessary. Clean housing with cleaning cloth.	

Table 1. Field Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	Annually	250	Hardware and Sound Insulation	Inspect for loose, damaged, or missing hardware and sound insulation. Tighten loose hardware. Repair or replace damaged or missing hardware and insulation.	Hardware or insulation loose, missing, or damaged.
8	Annually	1500	Radiator and Interior of Generator Set	Clean radiator exterior surfaces (WP 0072, Cleaning). Clean engine compartment	
9	Annually	1500	Magnetic Pickup	Remove, inspect, and clean magnetic pickup (WP 0096).	Magnetic pickup is damaged.
10	Annually		Wiring Harnesses	Inspect wiring harnesses for breaks and loose connections. Repair and tighten wiring harnesses, as necessary.	Wiring harnesses are damaged or connections are loose.
11	Annually	3000	Muffler	Check muffler for leaks, restriction, and accumulation of carbon. Replace or clean, as required.	Muffler leaks, is restricted, or has excessive carbon accumulation.
12	Annually	500	Auxiliary Fuel Filter	NOTE If the auxiliary fuel system is used as the primary fuel source, then the auxiliary fuel filter must be replaced semi-annually. Check for proper operation using auxiliary fuel system as primary source.	

MANDATORY REPLACEMENT PARTS

There are no replacement parts required for these PMCS procedures.

LUBRICATION INSTRUCTIONS

There are no special lubrication instructions. Refer to LO 9-6115-641-12 for generator set lubrication requirements.

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF DC ELECTRICAL SYSTEM, BATTERY AND SLAVE RECEPTACLE CABLES: INSPECTION, REMOVAL, CLEANING, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Battery Terminal Cleaner

Personnel Required

91D (1)
Assistant (1)

References

Nato Slave Receptacle (WP 0011)
(WP 0132 through WP 0136)

Equipment Condition

Shut Down Generator Set
Battery Disconnect Switch Off

WARNING

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect the batteries before performing maintenance on the slave receptacle. Failure to comply with this warning can cause injury or death to personnel.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

NOTE

This procedure is typical for the positive, negative, and interconnect battery cables, and the positive and negative NATO slave receptacle cables.

INSPECTION

1. Shutdown generator set.

INSPECTION – CONTINUED

2. Open engine access doors.
3. Inspect battery/slave receptacle cables for security; cracked insulation; broken, burned, or corroded terminals; missing parts; or other damage. Close engine access doors.

END OF TASK**REMOVAL**

1. Shutdown generator set.
2. Open engine access doors.

NOTE

Tag all cables before removal.

3. Disconnect negative battery cable terminal lug (Figure 1, Item 1) from battery.
4. Disconnect and remove applicable cable assembly (Figure 1 and WP 0011, Figure 1).

END OF TASK**CLEANING**

1. Remove terminal cover(s) (Figure 1, Item 2) from battery post(s), if applicable.
2. If necessary, clean battery post(s) and cable terminals with battery terminal cleaner.
3. Install terminal cover(s) (Figure 1, Item 2), if removed.

END OF TASK**REPAIR****WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

NOTE

If cable cannot be repaired, refer to WP 0132 through WP 0136.

1. Remove broken or damaged terminal as shown in Figure 1 and WP 0011, Figure 1.
2. Slide new shrinkable tubing (Figure 1, Item 4, and WP 0011, Figure 1) over cable end.
3. Install applicable terminal to cable end (WP 0132 through WP 0136).
4. Heat shrinkable tubing (Figure 1, Item 4) with heat gun until secure.

END OF TASK**INSTALLATION**

1. Install cable assembly as shown in Figure 1 and WP 0011, Figure 1.

INSTALLATION – CONTINUED

2. Connect negative battery cable terminal lug (Figure 1, Item 1) to battery. Close engine access doors.

NOTE

5 kW generator set may be provided with either maintenance free batteries or batteries requiring maintenance.

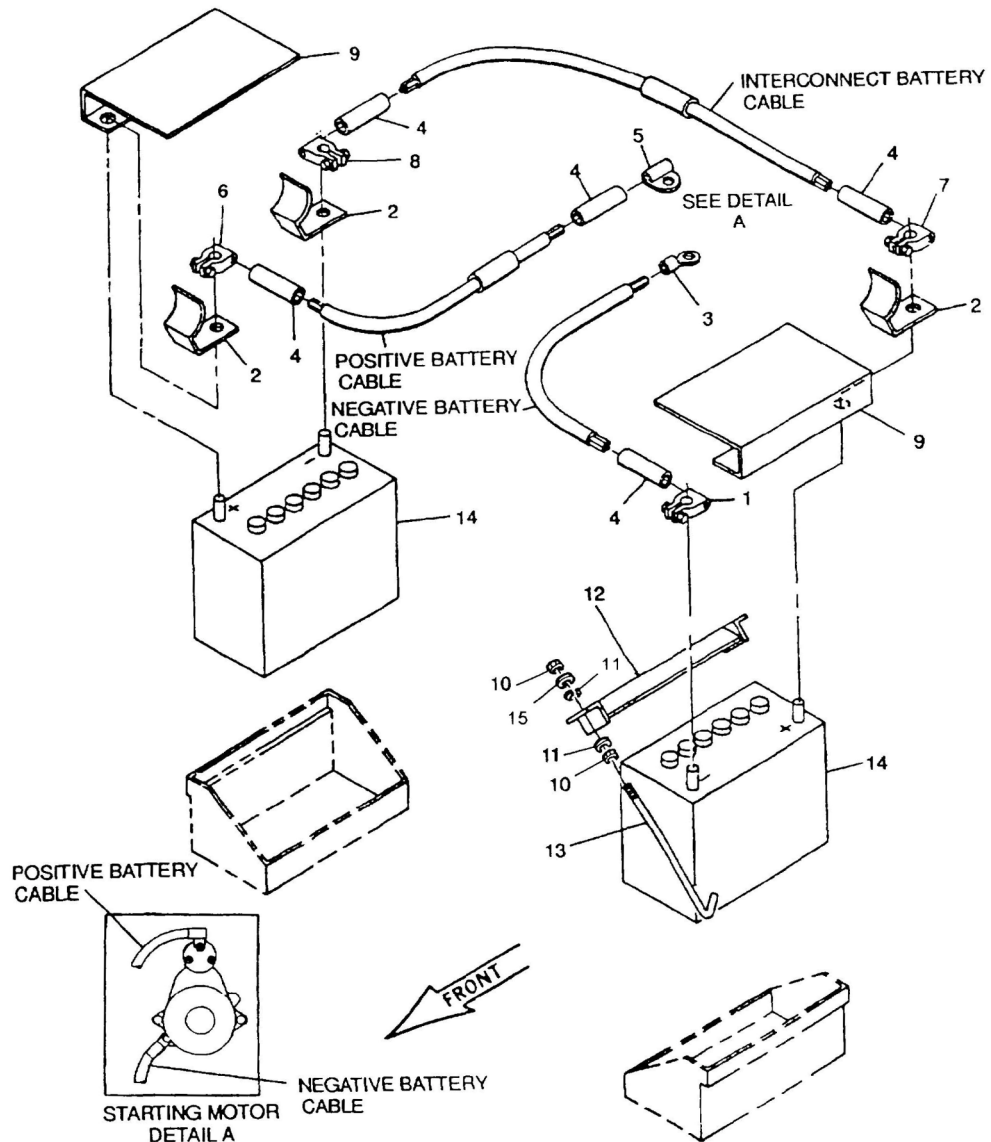


Figure 1. Batteries and Cables.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
**MAINTENANCE OF DC ELECTRICAL SYSTEM, BATTERIES:
TESTING, REMOVAL, INSPECTION, SERVICING, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Battery and Slave Receptacle Cables (WP 0009)
Expendable and Durable Items List (WP 0150)

Materials/Parts

New Lockwashers

Equipment Condition

Grounded, Off & Operational

Personnel Required

91D (1)
Assistant (1)

TESTING**WARNING**

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

Testing (Maintenance Free Batteries)

1. Shutdown generator set.
2. Open left side engine access door and connect multimeter to battery.
3. Using dead crank switch, crank engine for 15 seconds while observing multimeter. Voltage reading should not drop below 9.6 VDC and should return to 12 VDC when cranking has stopped.
4. Open right side engine access door and connect multimeter to battery. Perform Step 3 above.
5. Recharge or replace batteries as necessary. After recharge, retest batteries per Step 3 above.

Testing (Batteries Requiring Maintenance).

1. Shutdown generator set.
2. Open engine access doors and disconnect negative battery cable terminal (WP 0009, Figure 1, Item 1).
3. Remove battery vent caps.
4. Test specific gravity of electrolyte in each battery cell with a hydrometer. Refer to Table 1 for state of charge with specific gravity corrected to 80 °F (27 °C). Refer to Table 2 for specific gravity temperature corrections.

Table 1. State of Charge with Specific Gravity Correct to 80 °F (27 °C).

SPECIFIC GRAVITY	PERCENT CHARGE
1.280	100
1.250	75
1.220	50

TESTING – CONTINUED**Table 1. State of Charge with Specific Gravity Correct to 80 °F (27 °C). – Continued**

SPECIFIC GRAVITY	PERCENT CHARGE
1.190	25
1.160	Little useful capacity
1.130	Discharged

Table 2. Specific Gravity Temperature Corrections.

TEMPERATURE °F	CORRECTION FACTOR
+120 °F (49 °C)	+0.016
+115 °F (46 °C)	+0.014
+110 °F (43 °C)	+0.012
+105 °F (41 °C)	+0.010
+100 °F (38 °C)	+0.008
+95 °F (35 °C)	+0.006
+90 °F (32 °C)	+0.004
+85 °F (29 °C)	+0.002
+80 °F (27 °C)	0
+75 °F (24 °C)	-0.002
+70 °F (21 °C)	-0.004
+65 °F (19 °C)	-0.006
+60 °F (16 °C)	-0.008
+55 °F (13 °C)	-0.010
+50 °F (10 °C)	-0.012
+45 °F (7 °C)	-0.014
+40 °F (5 °C)	-0.016
+35 °F (2 °C)	-0.018
+30 °F (-1 °C)	-0.020
+25 °F (-4 °C)	-0.022
+20 °F (-7 °C)	-0.024
+15 °F (-9 °C)	-0.026
+10 °F (-12 °C)	-0.028
+5 °F (-15 °C)	-0.030
0 °F (-18 °C)	-0.032
-5 °F (-20 °C)	-0.034
-10 °F (-23 °C)	-0.036
-15 °F (-26 °C)	-0.038

TESTING – CONTINUED**Table 2. Specific Gravity Temperature Corrections. – Continued**

TEMPERATURE °F	CORRECTION FACTOR
-20 °F (-29 °C)	-0.040

5. Recharge or replace batteries, as necessary. Retest batteries per above instructions.
6. Install battery vent caps.
7. Connect negative battery cable and close engine access doors.

END OF TASK**REMOVAL****WARNING**

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

WARNING

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open engine access doors,
3. Disconnect negative battery cable terminal lug (WP 0009, Figure 1, Item 1).
4. Disconnect positive battery cable terminal lug (WP 0009, Figure 1, Item 6).
5. Disconnect interconnect battery cable terminals (WP 0009, Figure 1, Items 7 and 8) and remove interconnect battery cable assembly.
6. Remove terminal covers (WP 0009, Figure 1, Item 2) and battery covers (WP 0009, Figure 1, Item 9).
7. Remove nuts (WP 0009, Figure 1, Item 10), lockwashers (WP 0009, Figure 1, Item 15), washers (WP 0009, Figure 1, Item 11), retaining bars (WP 0009, Figure 1, Item 12), and retaining clamps (WP 0009, Figure 1, Item 13). Discard lockwashers (WP 0009, Figure 1, Item 15).
8. Remove batteries (WP 0009, Figure 1, Item 14).

END OF TASK

INSPECTION

1. Remove batteries (Removal).
2. Inspect batteries for cracked cases; broken, burned, or corroded posts; missing parts; and other damage.
3. Install batteries (Installation).

END OF TASK**SERVICING**

1. Shutdown generator set.
2. Disconnect battery cables (Removal).
3. Remove terminal covers (WP 0009, Figure 1, Item 2) and battery covers (WP 0009, Figure 1, Item 9).
4. If applicable, clean cable terminal lugs and battery posts with battery terminal cleaner.
5. Install terminal covers (WP 0009, Figure 1, Item 2) on battery covers (WP 0009, Figure 1, Item 9).
6. Connect battery cables (Installation).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Position batteries (WP 0009, Figure 1, Item 14) in generator set. Ensure that batteries are serviced and fully charged.
2. Install battery covers (WP 0009, Figure 1, Item 9) and terminal covers (WP 0009, Figure 1, Item 2).
3. Apply general purpose grease (WP 0150, Item 9) to battery posts and cable terminal lugs (WP 0009, Figure 1, Items 1, 6, 7, and 8).
4. Install battery retaining bars (WP 0009, Figure 1, Item 12), clamps (WP 0009, Figure 1, Item 13), washers (WP 0009, Figure 1, Item 11), new lockwashers (WP 0009, Figure 1, Item 15), and nuts (WP 0009, Figure 1, Item 10) on both sides.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

5. Position interconnect battery cable on battery and connect terminals (WP 0009, Figure 1, Items 7 and 8).
6. Connect positive cable terminal (WP 0009, Figure 1, Item 6) and negative battery cable terminal (WP 0009, Figure 1, Item 1). Close engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF DC ELECTRICAL SYSTEM, NATO SLAVE
RECEPTACLE: INSPECTION, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

New Lockwashers

Equipment ConditionGrounded, Off & Operational
Disconnect Batteries

WARNING

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect the batteries before performing maintenance on the slave receptacle. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION

1. Shutdown generator set.
2. Open engine access doors and disconnect negative battery cable.
3. Inspect NATO SLAVE RECEPTACLE for security, corrosion, missing hardware, and other damage.
4. Connect negative battery cable and close engine access doors.

END OF TASK**REMOVAL**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Open right side engine access door, remove bolt (Figure 1, Item 1), washer (Figure 1, Item 2), and disconnect negative cable terminal (Figure 1, Item 3) from slave receptacle (Figure 1, Item 9).
4. Remove bolt (Figure 1, Item 5), washer (Figure 1, Item 6), and disconnect positive cable terminal (Figure 1, Item 3) from slave receptacle (Figure 1, Item 9).
5. Remove bolts (Figure 1, Item 7), nuts (Figure 1, Item 8), and slave receptacle (Figure 1, Item 9) from generator set housing.
6. Remove bolt (Figure 1, Item 10), nut (Figure 1, Item 11) and cap (Figure 1, Item 12) from housing.

REMOVAL – CONTINUED

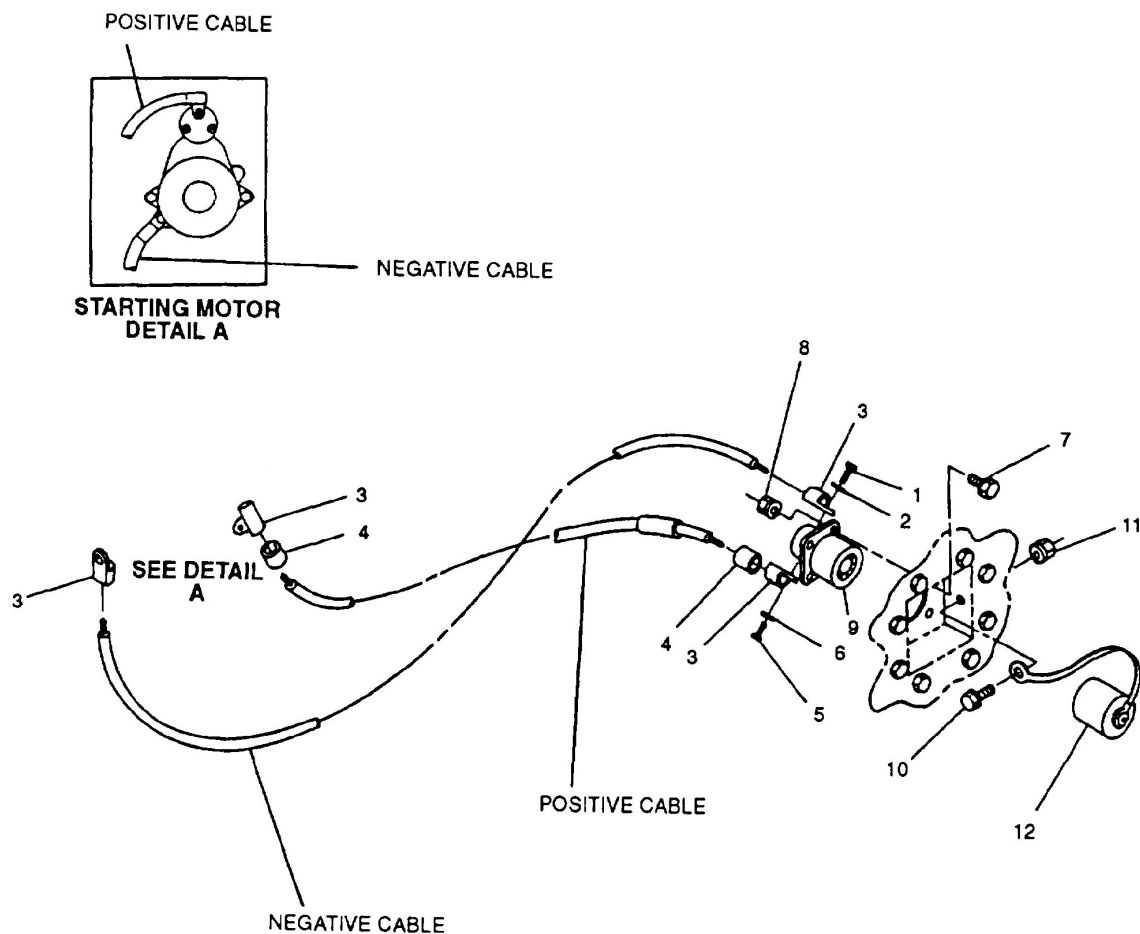


Figure 1. NATO Slave Receptacle and Cables.

END OF TASK

INSTALLATION

1. Insert slave receptacle (Figure 1, Item 9) into generator set housing.
2. Secure slave receptacle (Figure 1, Item 9) to generator set with bolts (Figure 1, Item 7) and nuts (Figure 1, Item 8).
3. Connect slave receptacle positive cable terminal (Figure 1, Item 3) to slave receptacle (Figure 1, Item 9) with bolt (Figure 1, Item 5) and washer (Figure 1, Item 6).
4. Connect negative cable terminal (Figure 1, Item 3) to slave receptacle (Figure 1, Item 9) with bolt (Figure 1, Item 1) and washer (Figure 1, Item 2).
5. Attach cap (Figure 1, Item 12) to housing with bolt (Figure 1, Item 10) and nut (Figure 1, Item 11).
6. Slide cap (Figure 1, Item 12) over slave receptacle (Figure 1, Item 9).
7. Connect negative battery cable and close engine access doors.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF DC ELECTRICAL SYSTEM, BATTERY CHARGING
ALTERNATOR: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Radiator (WP 0072)

Materials/Parts

New Lockwashers

Battery Charging Alternator

Equipment ConditionGrounded, Off & Operational

INSPECTION

1. Shutdown generator set.
2. Inspect battery charging alternator (Figure 1, Item 9) for loose mounting hardware, damaged or loose electrical connections, and other damage.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Inspect battery charging alternator (Figure 1, Item 9) for loose connections.
3. Set multimeter for VDC and connect between positive and negative terminals of alternator.
4. Start and operate generator set at rated frequency and voltage.
5. Multimeter reading should be between 27.5 and 29.5 VDC.
6. Shutdown generator set.
7. Battery charging alternator (Figure 1, Item 9) is defective and requires replacement, if reading is other than above.

END OF TASK**REMOVAL**

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.
3. Loosen bolts (WP 0072, Figure 1, Item 26) for overflow bottle mounting bracket (WP 0072, Figure 1, Item 29) and move away from fan guard.

REMOVAL – CONTINUED

4. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and right fan guard (WP 0072, Figure 1, Item 4).
5. Loosen bolt (Figure 1, Item 1), nut (Figure 1, Item 4), and move battery charging alternator (Figure 1, Item 9) so fan belt (WP 0072, Figure 1, Item 33) can slip off battery charging alternator pulley and can be removed from crankshaft and water pump pulleys.
6. Tag and disconnect alternator (Figure 1, Item 9) electrical leads.
7. Remove bolt (Figure 1, Item 1), lockwasher (Figure 1, Item 2), and washer (Figure 1, Item 3). Discard lockwasher (Figure 1, Item 2).
8. Remove nut (Figure 1, Item 4), lockwasher (Figure 1, Item 5), washer (Figure 1, Item 6), spacer (Figure 1, Item 7), and bolt (Figure 1, Item 8). Discard lockwasher (Figure 1, Item 5).
9. Remove battery charging alternator (Figure 1, Item 9) from generator set.
10. If replacing alternator, remove and retain nut (Figure 1, Item 10), lockwasher (Figure 1, Item 11), and pulley (Figure 1, Item 12) from alternator (Figure 1, Item 9). Discard lockwasher (Figure 1, Item 11).

END OF TASK**INSTALLATION**

1. If removed, install pulley (Figure 1, Item 12) on battery charging alternator (Figure 1, Item 9) with new lockwasher (Figure 1, Item 11) and nut (Figure 1, Item 10). Torque nut (Figure 1, Item 10) 40 to 50 ft•lbs (54 to 68 N•m).
2. Position battery charging alternator (Figure 1, Item 9) in generator set.
3. Install bolt (Figure 1, Item 8) spacer (Figure 1, Item 7), washer (Figure 1, Item 6), new lockwasher (Figure 1, Item 5), and nut (Figure 1, Item 4).
4. Slip fan belt (WP 0072, Figure 1, Item 33) onto battery charging alternator pulley.
5. Install bolt (Figure 1, Item 1), new lockwasher (Figure 1, Item 2), and washer (Figure 1, Item 3).
6. Install electrical leads and remove tags.
7. Adjust fan drive belt, WP 0073, Adjustment.
8. Tighten bolts (WP 0072, Figure 1, Item 26) for overflow mounting bracket (WP 0072, Figure 1, Item 29).
9. Install right side fan guard (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and washers (WP 0072, Figure 1, Item 3).
10. Connect negative battery cable and close engine access doors.

INSTALLATION – CONTINUED

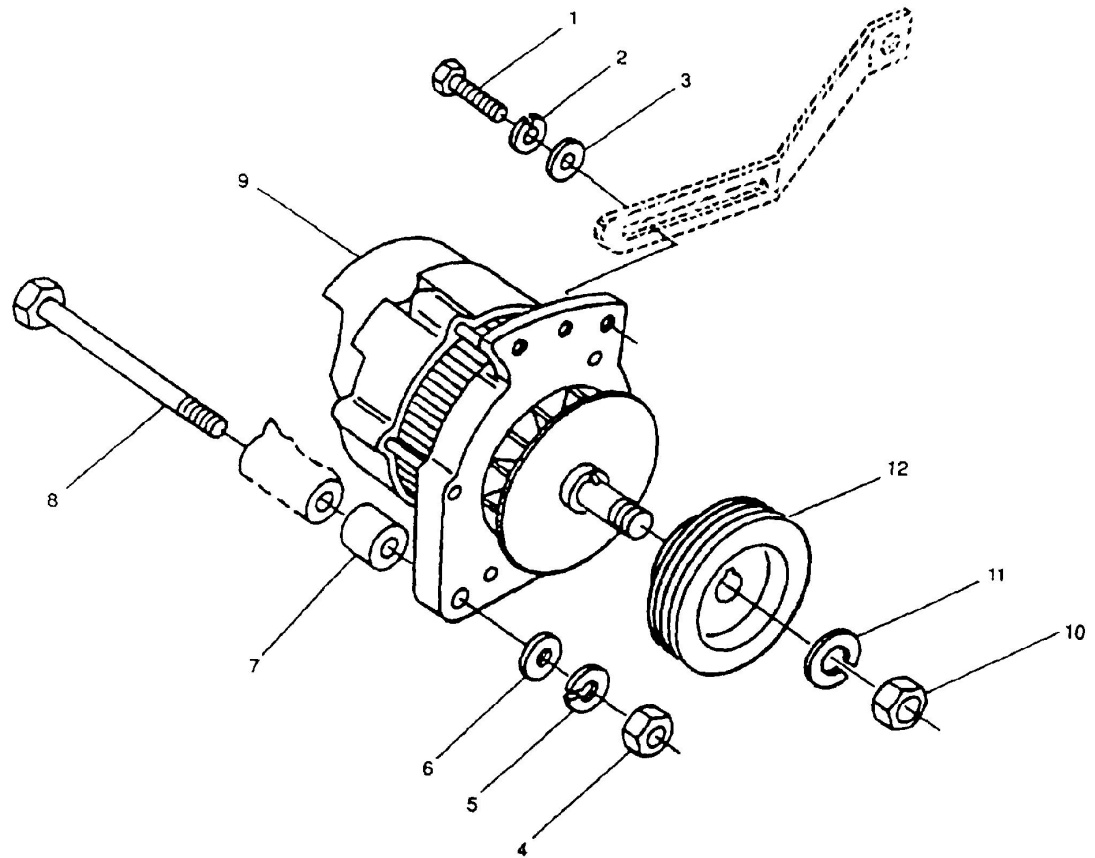


Figure 1. Battery Charging Alternator.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
MAINTENANCE OF HOUSING, ACCESS DOORS: INSPECTION, REMOVAL, REPAIR, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves (Heat Resistant) & Additional Protective Clothing

Protective Eyewear & Mask

CARC Paint

Fine Abrasive Paper (WP 0150, Table 1, Item 16)

New Lockwashers

References

TM-43-0139

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

NOTE

This procedure is written for the left engine access door, but is typical for all access doors, hinges, latches, and data plates. When removing and installing left side engine access door, note position of spacers for door hold open mechanism.

INSPECTION

1. Shutdown generator set.
2. Inspect access doors, hinges, latches, door hold open mechanisms, and storage and document boxes for loose and missing hardware, cracks, dents, loose paint, and corrosion.
3. Inspect data plates for readability and loose or missing rivets.

END OF TASK**REMOVAL****WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

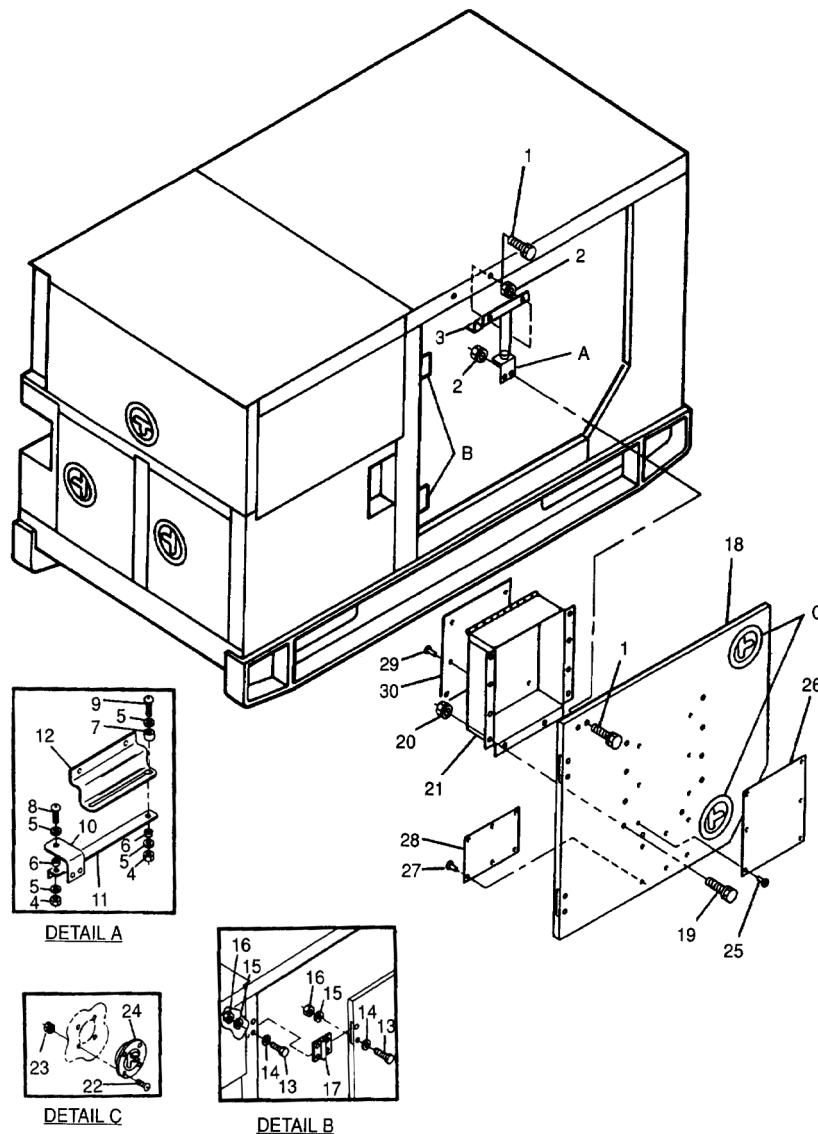


Figure 1. Generator Set Access Doors.

1. Shutdown generator set.
2. Remove bolts (Figure 1, Item 1), nuts (Figure 1, Item 2), and hold open mechanism (Figure 1, Item 3) from right side engine access door (Figure 1, Item 18) and generator set.
3. Remove nuts (Figure 1, Item 4) washers (Figure 1, Item 5), spacers (Figure 1, Items 6 and 7), screws (Figure 1, Items 8 and 9), door holding bracket (Figure 1, Item 10), and door link support (Figure 1, Item 11) from door link flange (Figure 1, Item 12).

REMOVAL – CONTINUED

4. Remove bolts (Figure 1, Item 13), washers (Figure 1, Item 14), lockwashers (Figure 1, Item 15), nuts (Figure 1, Item 16), hinges (Figure 1, Item 17), and right side engine access door (Figure 1, Item 18) from generator set. Discard lockwashers (Figure 1, Item 15).
5. Remove bolts (Figure 1, Item 19), nuts (Figure 1, Item 20), and document box (Figure 1, Item 21) from right side engine access door (Figure 1, Item 18).
6. Remove screws (Figure 1, Item 22), nuts (Figure 1, Item 23), and latch (Figure 1, Item 24) from right side engine access door (Figure 1, Item 18).
7. Drill out rivets (Figure 1, Item 25) and remove lifting and tiedown plate (Figure 1, Item 26) from right side engine access door (Figure 1, Item 18).
8. Drill out rivets (Figure 1, Item 27) and remove schematic diagram (Figure 1, Item 28) from document box (Figure 1, Item 21).

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Repair all dents and cracks and remove loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surfaces in accordance with TM 43-0139. (F) Use applicable directives.
4. Replace unreadable data plates.
5. Replace loose or missing rivets.

END OF TASK**INSTALLATION**

1. Install schematic diagram (Figure 1, Item 28) on document box (Figure 1, Item 21) with rivets (Figure 1, Item 27).
2. Install lifting and tiedown plate (Figure 1, Item 26) on right side engine access door (Figure 1, Item 18) with rivets (Figure 1, Item 25).
3. Install latches (Figure 1, Item 24) on right side engine access door (Figure 1, Item 18) with screws (Figure 1, Item 22) and nuts (Figure 1, Item 23).
4. Install document box (Figure 1, Item 21) on right side engine access door (Figure 1, Item 18) with bolts (Figure 1, Item 19) and nuts (Figure 1, Item 20).

INSTALLATION – CONTINUED

5. Install hinges (Figure 1, Item 17) and right side engine access door (Figure 1, Item 18) on generator set with bolts (Figure 1, Item 13), washers (Figure 1, Item 14), new lockwashers (Figure 1, Item 15), and nuts (Figure 1, Item 16).
6. Install door holding bracket (Figure 1, Item 10) and door link support (Figure 1, Item 11) on door link flange (Figure 1, Item 12) with screws (Figure 1, Items 8 and 9), spacers (Figure 1, Items 6 and 7), washers (Figure 1, Item 5), and nuts (Figure 1, Item 4).
7. Install door hold open mechanism (Figure 1, Item 3) on generator set and right side engine access door (Figure 1, Item 18) with bolts (Figure 1, Item 1) and nuts (Figure 1, Item 2).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF HOUSING, CONTROL BOX TOP
PANEL: REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves & Additional Protective Clothing

Goggles

New Lockwashers

CARC Paint

Fine Grit Abrasive Paper (WP 0150, Table 1, Item 16)

References

TM-43-0139

Access Doors (WP 0013)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control panel access door (WP 0013, Removal).

CAUTION

The control box top panel is attached to the generator set with a silicone sealant to prevent water from entering the control box. Care must be taken not to bend or scratch the control box top panel when separating.

4. Remove bolts (Figure 1, Item 1), nuts (Figure 1, Item 2), and top panel (Figure 1, Item 3).

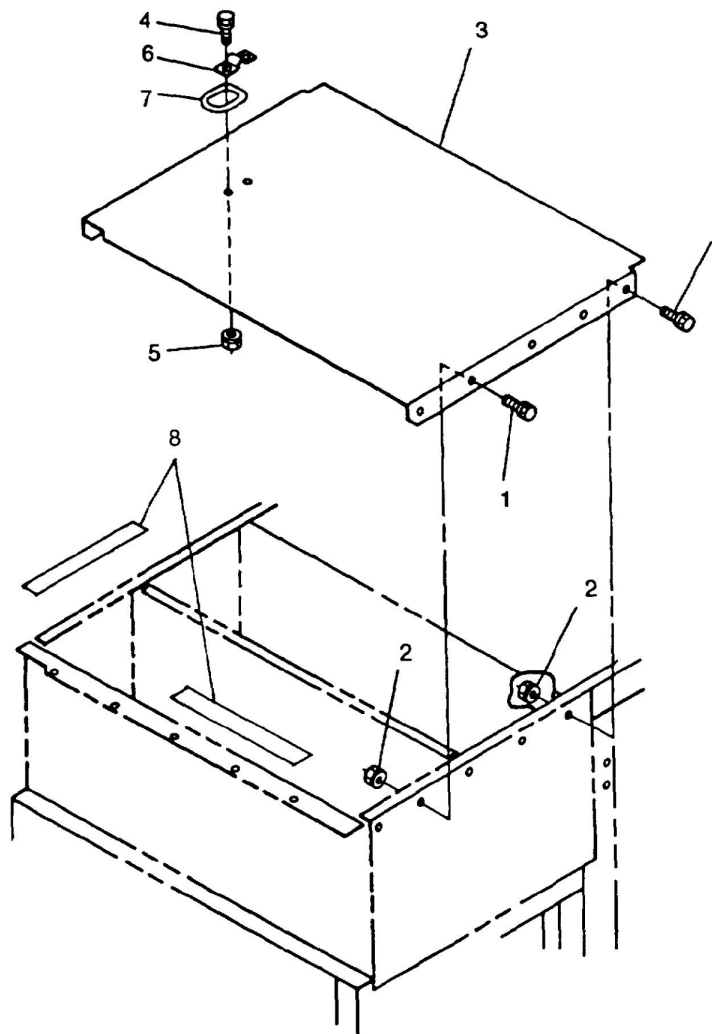
REMOVAL – CONTINUED

Figure 1. Control Box Top Panel.

5. If damaged, remove gasket (Figure 1, Item 8).
6. Remove bolts (Figure 1, Item 4), nuts (Figure 1, Item 5), bracket (Figure 1, Item 6), and ring (Figure 1, Item 7) from top panel (Figure 1, Item 3).

END OF TASK**INSPECTION**

1. Shutdown generator set.
2. Inspect control box top panel for dents, cracks, loose paint, and corrosion.

END OF TASK

REPAIR**WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Repair all dents and cracks, and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surfaces in accordance with TM 43-0139. (F) Refer to applicable directives.

END OF TASK**INSTALLATION**

1. Install ring (Figure 1, Item 7) and bracket (Figure 1, Item 6) on control box top panel (Figure 1, Item 3) with bolts (Figure 1, Item 4) and nuts (Figure 1, Item 5).

NOTE

When replacing sealant with new gasket (Figure 1, Item 8), ensure all old sealant residue is completely removed.

2. If gasket (Figure 1, Item 8) was removed, install new gasket (Figure 1, Item 8).
3. Immediately install top panel (Figure 1, Item 3) with bolts (Figure 1, Item 1) and nuts (Figure 1, Item 2).
4. Install control panel access door (WP 0013, Installation).
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF HOUSING, TOP HOUSING PANEL: REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Materials/Parts**

CARC Paint
Solvent
New Lockwashers
Protective Eyewear, Mask & Gloves
Fine Grit Abrasive Paper (WP 0150, Table 1, Item 16)

References

TM-43-0139
Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

Personnel Required

91D (1)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove bolts (Figure 1, Items 1 and 2), lockwashers (Figure 1, Item 11), washers (Figure 1, Item 12), nuts (Figure 1, Item 3), and top housing panel (Figure 1, Item 4). Discard lockwashers (Figure 1, Item 11).
4. Remove bolts (Figure 1, Item 5), nuts (Figure 1, Item 6), bracket (Figure 1, Item 7), and exhaust door (Figure 1, Item 8) from top housing panel (Figure 1, Item 4).

END OF TASK

INSPECTION

1. Shutdown generator set.
2. Inspect top housing panel (Figure 1, Item 4), exhaust door (Figure 1, Item 8), and bracket (Figure 1, Item 7) for dents, cracks, loose paint, and corrosion.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Repair all dents and cracks, and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surfaces in accordance with TM 43-0139. (F) Refer to applicable directives.

END OF TASK**INSTALLATION**

1. Install exhaust door (Figure 1, Item 8) and bracket (Figure 1, Item 7) to top housing panel (Figure 1, Item 4) with bolts (Figure 1, Item 5) and nuts (Figure 1, Item 6).

INSTALLATION – CONTINUED

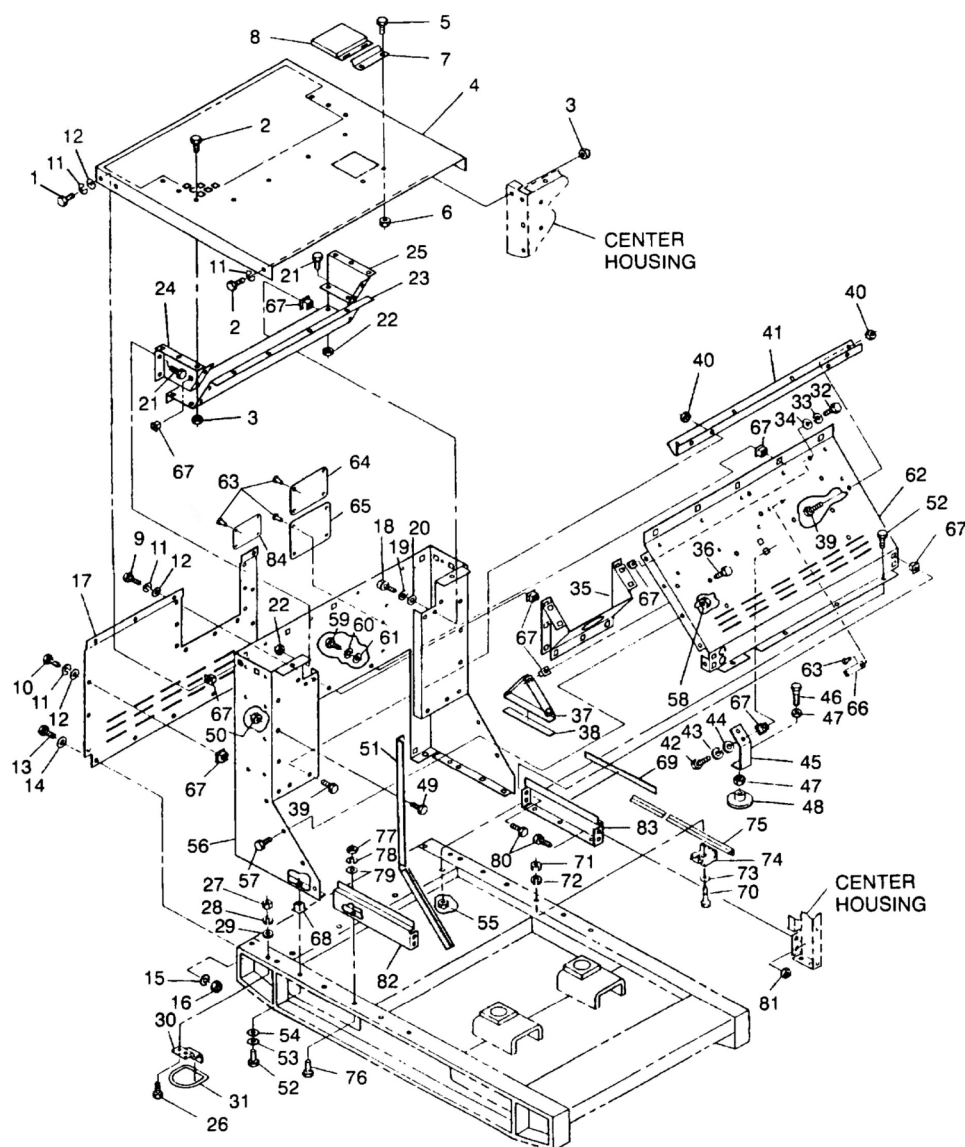


Figure 1. Generator Set Front Housing Section.

2. Install top housing panel (Figure 1, Item 4) on generator set with bolts (Figure 1, Items 1 and 2), new lock-washers (Figure 1, Item 11), washers (Figure 1, Item 12), and nuts (Figure 1, Item 3).
3. Connect negative battery cable and close left side engine access door.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
MAINTENANCE OF HOUSING, FRONT HOUSING PANEL:
REMOVAL, INSPECTION, REPAIR, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves & Protective Clothing

New Lockwashers

Solvent

CARC Paint

Fine Grit Abrasive Paper (WP 0150, Table 1, Item 16)

References

TM-43-0139

Top Housing Panel (WP 0015)

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove bolts (WP 0015, Figure 1, Items 1 and 2), lockwashers (WP 0015, Figure 1, Item 11), washers (WP 0015, Figure 1, Item 12), nuts (WP 0015, Figure 1, Item 3), and top housing panel (WP 0015, Figure 1, Item 4). Discard lockwashers (WP 0015, Figure 1, Item 11).
4. Remove bolts (WP 0015, Figure 1, Item 13), washers (WP 0015, Figure 1, Item 14), lockwashers (WP 0015, Figure 1, Item 15), and nuts (WP 0015, Figure 1, Item 16). Discard lockwashers (WP 0015, Figure 1, Item 15).

REMOVAL – CONTINUED

5. Remove front housing panel (WP 0015, Figure 1, Item 17).

END OF TASK**INSPECTION**

Inspect front housing panel (WP 0015, Figure 1, Item 17) for dents, cracks, loose paint, and corrosion.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Repair all dents and cracks and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surfaces in accordance with TM 43-0139. (F) Refer to applicable directives.

END OF TASK**INSTALLATION**

1. Install front housing panel (WP 0015, Figure 1, Item 17) on generator set with bolts (WP 0015, Figure 1, Item 13), washers (WP 0015, Figure 1, Item 14), new lockwashers (WP 0015, Figure 1, Item 15), and nuts (WP 0015, Figure 1, Item 16).
2. Install bolts (WP 0015, Figure 1, Items 9 and 10), new lockwashers (WP 0015, Figure 1, Item 11), and washers (WP 0015, Figure 1, Item 12).
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF HOUSING, FRONT HOUSING SECTION:
REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Protective Clothing

New Lockwashers

CARC Paint

Fine Grit Abrasive Paper (WP 0150, Table 1, Item 16)

Personnel Required

91D (1)

References

TM-43-0139

Top Housing Panel (WP 0015)

Front Housing Panel (WP 0016)

Radiator (WP 0072)

Fuel Level Sender (WP 0078)

Fuel Tank Filler Neck (WP 0083)

Auxiliary Fuel Pump (WP 0086)

Fuel Transfer Pump (WP 0087)

Oil Drain Line (WP 0090)

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove top housing panel (WP 0015, Removal).
4. Remove bolts (WP 0015, Figure 1, Item 18), lockwashers (WP 0015, Figure 1, Item 19), and washers (WP 0015, Figure 1, Item 20). Discard lockwashers (WP 0015, Figure 1, Item 19).
5. Remove bolts (WP 0015, Figure 1, Item 21), nuts (WP 0015, Figure 1, Item 22), and deflectors (WP 0015, Figure 1, Items 23, 24, and 25).
6. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and fan guards (WP 0072, Figure 1, Item 4).
7. Remove front housing panel (WP 0016, Removal).
8. Remove auxiliary fuel pump (WP 0086, Removal).
9. Remove fuel tank filler neck (WP 0083, Removal).
10. Remove fuel transfer pump (WP 0087, Removal).
11. Remove radiator (WP 0072, Removal).
12. Remove bolts (WP 0015, Figure 1, Item 26), nuts (WP 0015, Figure 1, Item 27), lockwashers (WP 0015, Figure 1, Item 28), washers (WP 0015, Figure 1, Item 29), front lifting ring brackets (WP 0015, Figure 1, Item 30), and lifting rings (WP 0015, Figure 1, Item 31) from skid base. Discard lockwashers (WP 0015, Figure 1, Item 28).
13. Remove screws (WP 0078, Figure 1, Item 18), nuts (WP 0078, Figure 1, Item 19), and fuel float module (WP 0078, Figure 1, Item 20).
14. Remove bolts (WP 0015, Figure 1, Item 32), lockwashers (WP 0015, Figure 1, Item 33), washers (WP 0015, Figure 1, Item 34), and filler neck panel (WP 0015, Figure 1, Item 35) from air deflector (WP 0015, Figure 1, Item 62). Discard lockwasher (WP 0015, Figure 1, Item 33).
15. Remove bolts (WP 0015, Figure 1, Item 36) and fuel tank holddown brackets (WP 0015, Figure 1, Item 37).
16. Remove bolts (WP 0015, Figure 1, Item 39), nuts (WP 0015, Figure 1, Item 40), and channel (WP 0015, Figure 1, Item 41) from front housing (WP 0015, Figure 1, Item 56) and air deflector (WP 0015, Figure 1, Item 62).
17. Disconnect and cap fuel supply and fuel return lines at fuel tank fittings (WP 0078, Figure 1, Items 16 and 34).
18. Remove bolts (WP 0015, Figure 1, Item 42), lockwashers (WP 0015, Figure 1, Item 43), washers (WP 0015, Figure 1, Item 44), and bracket assembly (WP 0015, Figure 1, Item 45) from air deflector (WP 0015, Figure 1, Item 62). Discard lockwashers (WP 0015, Figure 1, Item 43).
19. Remove bolt (WP 0015, Figure 1, Item 46), nut (WP 0015, Figure 1, Item 47), and holddown plate (WP 0015, Figure 1, Item 48) from bracket assembly (WP 0015, Figure 1, Item 45).
20. Tag and disconnect electrical leads at fuel level sender (WP 0078, Figure 1, Item 4) and fuel float module (WP 0078, Figure 1, Item 20).
21. Remove door sills (Removal of Engine Access Door Sills).
22. Remove bolts (WP 0015, Figure 1, Item 49), nuts (WP 0015, Figure 1, Item 50), and door stops (WP 0015, Figure 1, Item 51) from front housing (WP 0015, Figure 1, Item 56).

REMOVAL – CONTINUED

23. Remove bolts (WP 0015, Figure 1, Item 52), lockwashers (WP 0015, Figure 1, Item 53), and washers (WP 0015, Figure 1, Item 54), nuts (WP 0015, Figure 1, Item 55) and front housing (WP 0015, Figure 1, Item 56) with air deflector (WP 0015, Figure 1, Item 62) from generator set. Discard lockwashers (WP 0015, Figure 1, Item 53).
24. Remove bolts (WP 0015, Figure 1, Item 57) and nuts (WP 0015, Figure 1, Item 58) from air deflector (WP 0015, Figure 1, Item 62) and housing (WP 0015, Figure 1, Item 56).
25. Remove bolts (WP 0015, Figure 1, Item 59), lockwashers (WP 0015, Figure 1, Item 60), washers (WP 0015, Figure 1, Item 61), and air deflector (WP 0015, Figure 1, Item 62). Discard lockwashers (WP 0015, Figure 1, Item 60).
26. If necessary, drill out rivets (WP 0015, Figure 1, Item 63), and remove identification plate (WP 0015, Figure 1, Item 64), set rating plate (WP 0015, Figure 1, Item 65), external fuel supply plate (WP 0015, Figure 1, Item 66), and IUID plate (WP 0015, Figure 1, Item 84).

END OF TASK**INSPECTION**

1. Shutdown generator set.
2. Inspect all front housing parts for dents, cracks, loose paint, corrosion, and other damage.
3. Check for missing or damaged cage nuts (WP 0015, Figure 1, Items 67 and 68).
4. Inspect door seals (WP 0015, Figure 1, Item 69) for tears, looseness, and deterioration.
5. Inspect cotton webbing (WP 0015, Figure 1, Item 38) for looseness or damage.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Repair all dents and cracks, and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surfaces in accordance with TM 43-0139. (F) Use applicable directives.
4. Replace all missing or damaged cage nuts (WP 0015, Figure 1, Items 67 and 68).
5. Replace damaged door seals (WP 0015, Figure 1, Item 69).

END OF TASK

INSTALLATION

1. If removed, install external fuel supply plate (WP 0015, Figure 1, Item 66), set rating plate (WP 0015, Figure 1, Item 65), identification plate (WP 0015, Figure 1, Item 64), and IUID plate (WP 0015, Figure 1, Item 84) with new rivets (WP 0015, Figure 1, Item 63).
2. Install air deflector (WP 0015, Figure 1, Item 62) on front housing (WP 0015, Figure 1, Item 56) with bolts (WP 0015, Figure 1, Item 59), new lockwashers (WP 0015, Figure 1, Item 60), and washers (WP 0015, Figure 1, Item 61).
3. Install bolts (WP 0015, Figure 1, Item 57) and nuts (WP 0015, Figure 1, Item 58) on air deflector (WP 0015, Figure 1, Item 62) and front housing (WP 0015, Figure 1, Item 56).
4. Install front housing (WP 0015, Figure 1, Item 56) with air deflector (WP 0015, Figure 1, Item 62) on generator set with bolts (WP 0015, Figure 1, Item 52), new lockwashers (WP 0015, Figure 1, Item 53), washers (WP 0015, Figure 1, Item 54) and nuts (WP 0015, Figure 1, Item 55).
5. Install door stops (WP 0015, Figure 1, Item 51) on front housing (WP 0015, Figure 1, Item 56) with bolts (WP 0015, Figure 1, Item 49) and nuts (WP 0015, Figure 1, Item 50).
6. Install door sills (Installation of Engine Access Door Sills).
7. Route electrical leads through air deflector (WP 0078, Figure 1, Item 62) and connect leads, as tagged, to fuel level sender (WP 0078, Figure 1, Item 4) and fuel float module (WP 0078, Figure 1, Item 20). Remove tags.
8. Install holddown plate (WP 0078, Figure 1, Item 48) on bracket assembly (WP 0078, Figure 1, Item 45) with bolt (WP 0078, Figure 1, Item 46) and nut (WP 0078, Figure 1, Item 47).
9. Install bracket assembly (WP 0078, Figure 1, Item 45) on air deflector (WP 0078, Figure 1, Item 62) with bolts (WP 0078, Figure 1, Item 42), new lockwashers (WP 0078, Figure 1, Item 43), and washers (WP 0078, Figure 1, Item 44).
10. Remove caps and connect fuel supply and fuel return lines at fuel tank fittings (WP 0078, Figure 1, Items 16 and 34).
11. Install channel (WP 0015, Figure 1, Item 41) on front housing (WP 0015, Figure 1, Item 56) and air deflector (WP 0015, Figure 1, Item 62) with bolts (WP 0015, Figure 1, Item 39) and nuts (WP 0015, Figure 1, Item 40).
12. If replacing fuel tank holddown brackets (WP 0015, Figure 1, Item 37), bond new cotton webbing strips (WP 0015, Figure 1, Item 38) to brackets with adhesive (WP 0150, Item 2).
13. Install fuel tank holddown brackets (WP 0015, Figure 1, Item 37) to air deflector (WP 0015, Figure 1, Item 62) with bolts (WP 0015, Figure 1, Item 36).
14. Install filler neck panel (WP 0015, Figure 1, Item 35) on air deflector (WP 0015, Figure 1, Item 62) with bolts (WP 0015, Figure 1, Item 32), new lockwashers (WP 0015, Figure 1, Item 33), and washers (WP 0015, Figure 1, Item 34).
15. Install fuel float module (WP 0078, Figure 1, Item 20) with screws (WP 0078, Figure 1, Item 18) and nuts (WP 0078, Figure 1, Item 19).
16. Install front lifting rings (WP 0015, Figure 1, Item 31) and lifting ring brackets (WP 0015, Figure 1, Item 30) on skid base with bolts (WP 0015, Figure 1, Item 26), new lockwashers (WP 0015, Figure 1, Item 28), washers (WP 0015, Figure 1, Item 29), and nuts (WP 0015, Figure 1, Item 27).
17. Install radiator (WP 0072, Installation).
18. Install fuel transfer pump (WP 0087, Installation).
19. Install fuel tank filler neck (WP 0083, Installation).
20. Install auxiliary fuel pump (WP 0086, Installation).
21. Install front housing panel (WP 0016, Installation).

INSTALLATION – CONTINUED

22. Install fan guards (WP 0015, Figure 1, Item 4) with bolts (WP 0015, Figure 1, Item 2) and washers (WP 0015, Figure 1, Item 3).
23. Install deflectors (WP 0015, Figure 1, Items 23, 24, and 25) with bolts (WP 0015, Figure 1, Item 21) and nuts (WP 0015, Figure 1, Item 22).
24. Install bolts (WP 0015, Figure 1, Item 18), new lockwashers (WP 0015, Figure 1, Item 19), and washers (WP 0015, Figure 1, Item 20).
25. Install top housing panel (WP 0015, Installation).
26. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****Removal of Engine Access Door Sills**

1. Remove bolt (WP 0015, Figure 1, Item 70), nut (WP 0015, Figure 1, Item 71), lockwasher (WP 0015, Figure 1, Item 72), washer (WP 0015, Figure 1, Item 73), front grounding rod bracket (WP 0015, Figure 1, Item 74), and grounding rods (WP 0015, Figure 1, Item 75) from generator set. Discard lockwasher (WP 0015, Figure 1, Item 72).
2. Remove bolts (WP 0090, Figure 1, Item 9), washers (WP 0090, Figure 1, Item 10), lockwashers (WP 0090, Figure 1, Item 11), nuts (WP 0090, Figure 1, Item 12), and plate (WP 0090, Figure 1, Item 13) from left side engine access door sill (WP 0090, Figure 1, Item 82). Discard lockwashers (WP 0090, Figure 1, Item 11).
3. Remove bolts (WP 0015, Figure 1, Item 76), nuts (WP 0015, Figure 1, Item 77), lockwashers (WP 0015, Figure 1, Item 78), and washers (WP 0015, Figure 1, Item 79) securing door sills (WP 0015, Figure 1, Items 82 and 83). Discard lockwashers (WP 0015, Figure 1, Item 78).
4. Remove bolts (WP 0015, Figure 1, Item 80), nuts (WP 0015, Figure 1, Item 81), and engine access door sills (WP 0015, Figure 1, Items 82 and 83).

END OF TASK**INSTALLATION****Installation of Engine Access Door Sills**

1. Install bolts (WP 0015, Figure 1, Item 80), nuts (WP 0015, Figure 1, Item 81), and engine access door sills (WP 0015, Figure 1, Items 82 and 83).
2. Install bolts (WP 0015, Figure 1, Item 76), nuts (WP 0015, Figure 1, Item 77), new lockwashers (WP 0015, Figure 1, Item 78), and washers (WP 0015, Figure 1, Item 79) securing door sills (WP 0015, Figure 1, Items 82 and 83).
3. Install bolts (WP 0090, Figure 1, Item 9), washers (WP 0090, Figure 1, Item 10), new lockwashers (WP 0090, Figure 1, Item 11), nuts (WP 0090, Figure 1, Item 12), and plate (WP 0090, Figure 1, Item 13) to left side door sill (WP 0090, Figure 1, Item 82).
4. Install bolt (WP 0015, Figure 1, Item 70), nut (WP 0015, Figure 1, Item 71), new lockwasher (WP 0015, Figure 1, Item 72), washer (WP 0015, Figure 1, Item 73), front housing grounding rod bracket (WP 0015, Figure 1, Item 74), and grounding rods (WP 0015, Figure 1, Item 75) on generator set.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF HOUSING, REAR HOUSING SECTION:
REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves, Protective Clothing & Eyewear

New Lockwashers

CARC Paint

Fine Grit Abrasive Paper (WP 0150, Table 1, Item 16)

Personnel Required

91D (1)

References

TM-43-0139

References - cont'd

Nato Slave Receptacle (WP 0011)

Access Doors (WP 0013)

Top Housing Panel (WP 0015)

Control Box Assembly (WP 0019)

Frequency Adjust Control Cable (WP 0091)

Low Oil Pressure Switch (WP 0092)

Oil Pressure Sender (WP 0093)

Dead Crank Switch (WP 0098)

Load Output Terminal Board Assembly (WP 0101)

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box assembly (WP 0019, Removal).
4. Remove load terminal and storage box access doors (WP 0013, Removal).
5. Remove top housing panel (WP 0015, Removal).
6. Remove engine access doors (WP 0013, Removal).
7. Remove DEAD CRANK switch (WP 0098, Removal).
8. Remove oil pressure sender (WP 0092, Figure 1, Item 2) (WP 0093, Removal) and oil line (WP 0092, Figure 1, Item 3) at engine fitting (WP 0092, Figure 1, Item 24).
9. Remove low oil pressure switch (WP 0092, Removal).
10. Remove NATO SLAVE RECEPTACLE (WP 0011, Removal).
11. Remove frequency adjust control cable assembly (WP 0091, Removal).
12. Remove air cleaner assembly (WP 0065, Removal).
13. Remove load terminal board upper mounting bracket (WP 0101, Removal).
14. Remove bolts (Figure 1, Item 1), nuts (Figure 1, Item 2), and upper door sill (Figure 1, Item 3).
15. Remove bolts (Figure 1, Item 4), nuts (Figure 1, Item 5), and center door post (Figure 1, Item 6).
16. Remove bolts (Figure 1, Item 7), nuts (Figure 1, Item 8), lockwashers (Figure 1, Item 9), washers (Figure 1, Item 10), and lower door sill (Figure 1, Item 11). Discard lockwashers (Figure 1, Item 9).
17. Remove bolts (Figure 1, Item 12), nuts (Figure 1, Item 13), lockwashers (Figure 1, Item 14), washers (Figure 1, Item 15), rear lifting rings brackets (Figure 1, Item 16), and lifting rings (Figure 1, Item 17). Discard lockwashers (Figure 1, Item 14).
18. Remove bolts (Figure 1, Item 18) and nuts (Figure 1, Item 19), four places each side.
19. Remove bolts (Figure 1, Item 20), lockwashers (Figure 1, Item 21), washers (Figure 1, Item 22), and rear side panels (Figure 1, Items 23 and 24). Discard lockwashers (Figure 1, Item 21).
20. Remove bolts (Figure 1, Item 25), nuts (Figure 1, Item 26), and slave receptacle box (Figure 1, Item 27) from side panel (Figure 1, Item 24).
21. Remove bolts (Figure 1, Item 28), lockwashers (Figure 1, Item 29), washers (Figure 1, Item 30), and deflector (Figure 1, Item 31) from side panel (Figure 1, Item 24). Discard lockwashers (Figure 1, Item 29).
22. Remove bolts (Figure 1, Item 32), nuts (Figure 1, Item 33), lockwashers (Figure 1, Item 34), washers (Figure 1, Item 35), and stiffener (Figure 1, Item 36) from side panel (Figure 1, Item 24). Discard lockwashers (Figure 1, Item 34).
23. Remove bolts (Figure 1, Item 37), nuts (Figure 1, Item 38), and load entrance box assembly (Figure 1, Item 39) from side panel (Figure 1, Item 23).
24. Remove bolts (Figure 1, Item 40), nuts (Figure 1, Item 41), and frequency control cable box (Figure 1, Item 42) from side panel (Figure 1, Item 23).
25. Remove nut (Figure 1, Item 72), bolt (Figure 1, Item 70), washer (Figure 1, Item 71), and power cable clamp (Figure 1, Item 73) from deflector (Figure 1, Item 46).
26. Remove bolts (Figure 1, Item 43), lockwashers (Figure 1, Item 44), washers (Figure 1, Item 45), and deflector (Figure 1, Item 46) from side panel (Figure 1, Item 23). Discard lockwashers (Figure 1, Item 44).

REMOVAL – CONTINUED

27. Remove bolts (Figure 1, Item 47), nuts (Figure 1, Item 48), lockwashers (Figure 1, Item 49), washers (Figure 1, Item 50), and stiffener (Figure 1, Item 51) from side panel (Figure 1, Item 23). Discard lockwashers (Figure 1, Item 49).

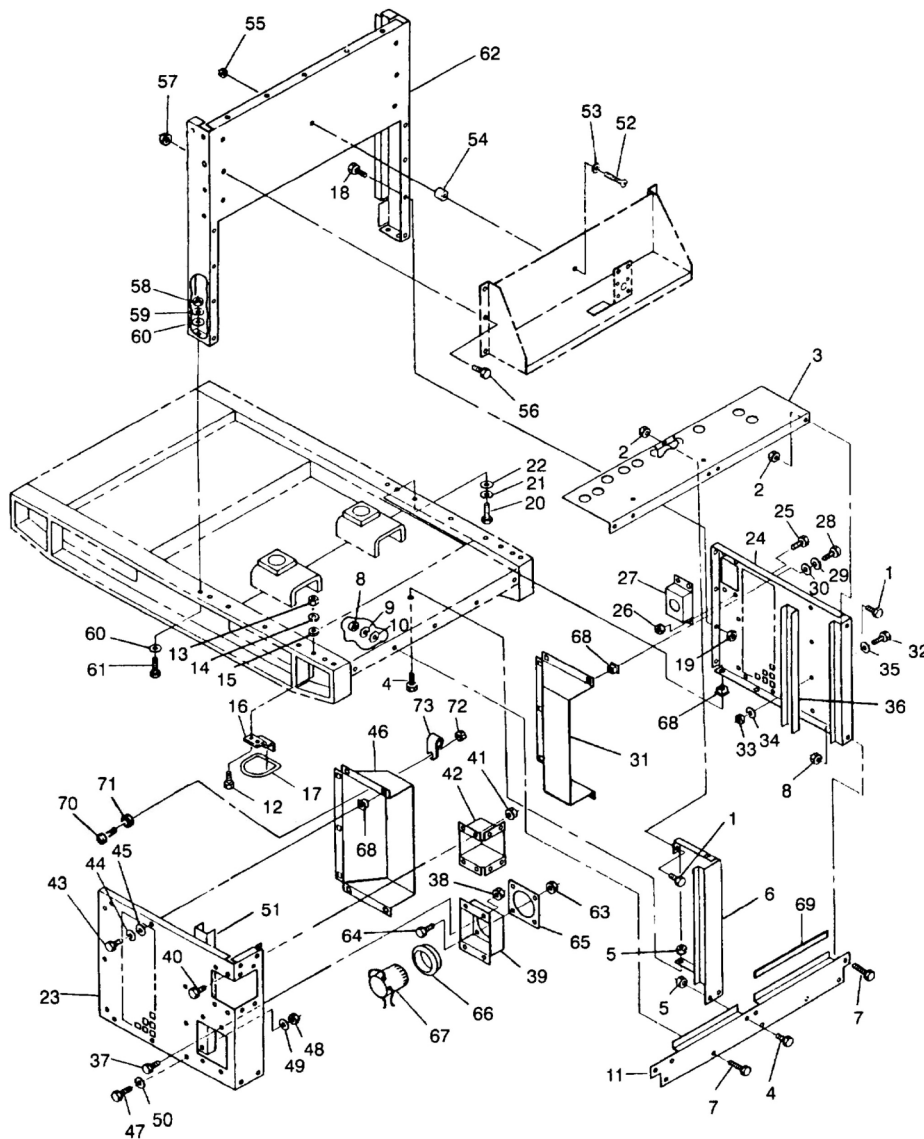


Figure 1. Generator Set Rear Housing Section.

28. Remove bolts (Figure 1, Items 52 and 56), nuts (Figure 1, Items 55 and 57), washer (Figure 1, Item 53), and spacer (Figure 1, Item 54) securing output box assembly to center housing panel (Figure 1, Item 62). Carefully lay output box assembly on generator.
29. Remove nuts (Figure 1, Item 58), lockwashers (Figure 1, Item 59), washers (Figure 1, Item 60), bolts (Figure 1, Item 61), and center housing panel (Figure 1, Item 62) from generator set. Discard lockwashers (Figure 1, Item 59).

REMOVAL – CONTINUED

30. If necessary, remove nuts (Figure 1, Item 63) and bolts (Figure 1, Item 64), and disassemble gasket (Figure 1, Item 65), ring (Figure 1, Item 66), and sleeve (Figure 1, Item 67) from load entrance box (Figure 1, Item 39).

END OF TASK**INSPECTION**

1. Shutdown generator set.
2. Inspect all rear housing parts for dents, cracks, loose paint, and corrosion.
3. Inspect for missing or damaged cage nuts (Figure 1, Item 68).
4. Inspect door seals (Figure 1, Item 69) for looseness and damage.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Repair all dents and cracks, and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surface in accordance with TM 43-0139. (F) Refer to applicable directives.
4. Replace all missing or damaged cage nuts (Figure 1, Item 68).
5. Replace damaged door seals (Figure 1, Item 69).

END OF TASK**INSTALLATION**

1. Install center housing panel (Figure 1, Item 62) on generator set with bolts (Figure 1, Item 61), washers (Figure 1, Item 60), new lockwashers (Figure 1, Item 59), and nuts (Figure 1, Item 58).
2. Secure output box assembly to center housing panel (Figure 1, Item 62) with bolts (Figure 1, Items 52 and 56), nuts (Figure 1, Items 55 and 57), washer (Figure 1, Item 53), and spacer (Figure 1, Item 54).
3. Install stiffener (Figure 1, Item 51) on side panel (Figure 1, Item 23) with bolts (Figure 1, Item 47), washers (Figure 1, Item 50), new lockwashers (Figure 1, Item 49), and nuts (Figure 1, Item 48).
4. Install deflector (Figure 1, Item 46) on side panel (Figure 1, Item 23) with bolts (Figure 1, Item 43), new lockwashers (Figure 1, Item 44), and washers (Figure 1, Item 45).

INSTALLATION – CONTINUED

5. Install power cable clamp (Figure 1, Item 73) onto deflector (Figure 1, Item 46) with bolt (Figure 1, Item 70), washer (Figure 1, Item 71), and nut (Figure 1, Item 72).
6. Install frequency control cable box (Figure 1, Item 42) on side panel (Figure 1, Item 23) with bolts (Figure 1, Item 40) and nuts (Figure 1, Item 41).
7. If removed, install sleeve (Figure 1, Item 67), ring (Figure 1, Item 66), gasket (Figure 1, Item 65), nuts (Figure 1, Item 63), and bolts (Figure 1, Item 64) to load entrance box (Figure 1, Item 39).
8. Install load entrance box assembly (Figure 1, Item 39) on side panel (Figure 1, Item 23) with bolts (Figure 1, Item 37) and nuts (Figure 1, Item 38).
9. Install stiffener (Figure 1, Item 36) on side panel (Figure 1, Item 24) with bolts (Figure 1, Item 32), washers (Figure 1, Item 35), new lockwashers (Figure 1, Item 34), and nuts (Figure 1, Item 33).
10. Install deflector (Figure 1, Item 31) on side panel (Figure 1, Item 24) with bolts (Figure 1, Item 28), new lockwashers (Figure 1, Item 29), and washers (Figure 1, Item 30).
11. Install slave receptacle box (Figure 1, Item 27) on side panel (Figure 1, Item 24) with bolts (Figure 1, Item 25) and nuts (Figure 1, Item 26).
12. Install rear side panels (Figure 1, Items 23 and 24) on generator set with bolts (Figure 1, Item 20), new lockwashers (Figure 1, Item 21), and washers (Figure 1, Item 22).
13. Install bolts (Figure 1, Item 18) and nuts (Figure 1, Item 19), to secure rear side panels (Figure 1, Items 23 and 24) to center housing panel (Figure 1, Item 62).
14. Install rear lifting ring brackets (Figure 1, Item 16) and lifting rings (Figure 1, Item 17) on skid with bolts (Figure 1, Item 12), washers (Figure 1, Item 15), new lockwashers (Figure 1, Item 14), and nuts (Figure 1, Item 13).
15. Install lower door sill (Figure 1, Item 11) with bolts (Figure 1, Item 7), washers (Figure 1, Item 10), new lockwashers (Figure 1, Item 9), and nuts (Figure 1, Item 8).
16. Install center door post (Figure 1, Item 6) with bolts (Figure 1, Item 4) and nuts (Figure 1, Item 5).
17. Install upper door sill (Figure 1, Item 3) with bolts (Figure 1, Item 1) and nuts (Figure 1, Item 2).
18. Install load terminal board upper mounting bracket (WP 0101, Installation).
19. Install air cleaner assembly (WP 0065, Installation).
20. Install frequency adjust control cable assembly (WP 0091, Installation).
21. Install NATO SLAVE RECEPTACLE (WP 0011, Installation).
22. Install low oil pressure switch (WP 0092, Installation).
23. Install oil pressure sender, WP 0093, Installation and oil line (WP 0092, Figure 1, Item 3) at engine fitting.
24. Install DEAD CRANK switch (WP 0098, Installation).
25. Install engine access doors (WP 0013, Installation).
26. Install top housing panel (WP 0015, Installation).
27. Install load terminal and storage box access doors (WP 0013, Installation).
28. Install control box assembly (WP 0019, Installation).
29. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL BOX
ASSEMBLY: INSPECTION, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Box Top Panel (WP 0014)

Materials/Parts

New Lockwashers

Equipment Condition

SHUTDOWN Generator Set (Allow System to Cool)
Engine Control Switch OFF/RESET
Battery Disconnect Switch OFF
DEAD CRANK SWITCH OFF

Personnel Required

91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Inspect control box assembly for cracks, breaks, corrosion, loose paint, and missing parts.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

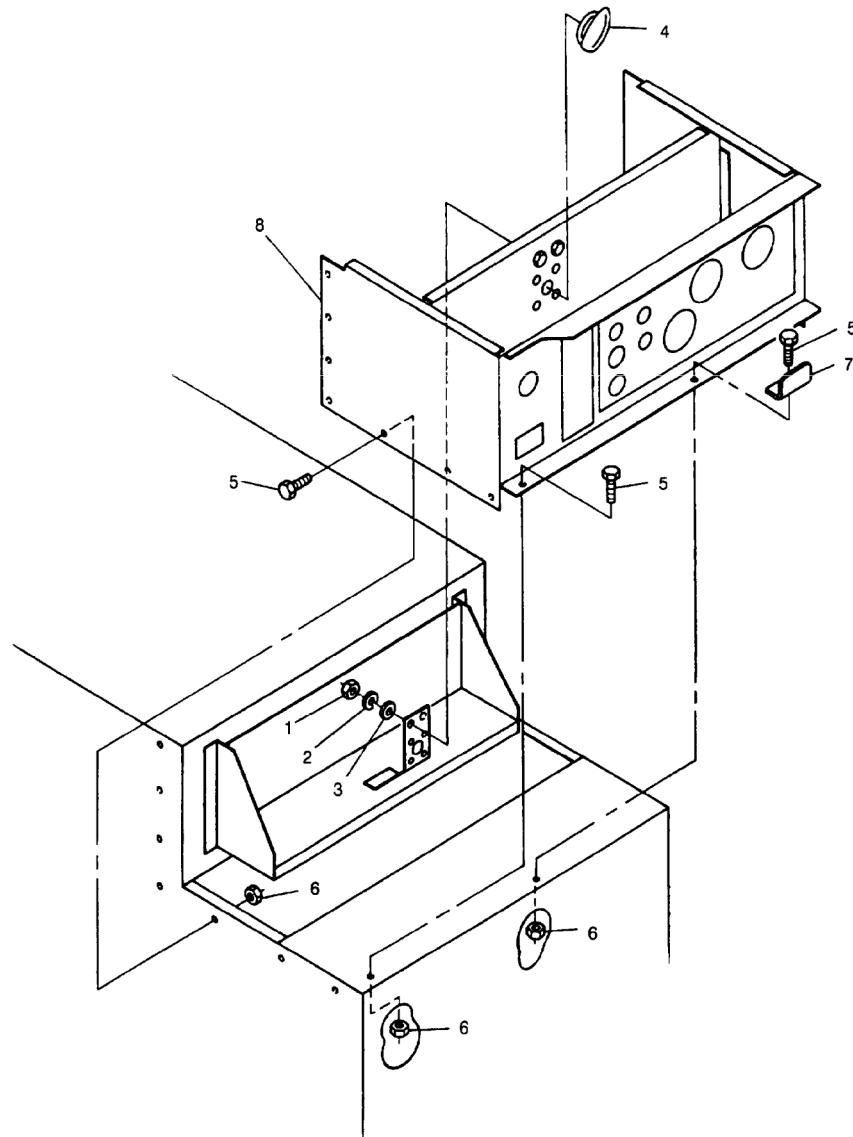
WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Open storage box access door and uncouple three harness connections on bottom of control box.
4. Remove control box top panel (WP 0014, Removal).
5. Remove nuts (Figure 1, Item 1), lockwashers (Figure 1, Item 2), washers (Figure 1, Item 3), and voltage reconnection switch knob (Figure 1, Item 4). Discard lockwashers (Figure 1, Item 2).
6. Remove bolts (Figure 1, Item 5), nuts (Figure 1, Item 6), and door striker Figure 1, Item 7).
7. Remove control box assembly (Figure 1, Item 8).

REMOVAL – CONTINUED**Figure 1. Control Box Assembly.****END OF TASK****REPAIR**

Repair control box assembly by replacing damaged terminals, damaged or missing hardware, and damaged or defective components.

END OF TASK

INSTALLATION

1. Install control box assembly (Figure 1, Item 8) and door striker (Figure 1, Item 7) and secure with bolts (Figure 1, Item 5), and nuts (Figure 1, Item 6).
2. Install voltage reconnection switch knob (Figure 1, Item 4), washers (Figure 1, Item 3), new lockwashers (Figure 1, Item 2), and nuts (Figure 1, Item 1).
3. Install control box top panel (WP 0014, Installation).
4. Connect three wiring harness connectors and close storage box access door.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONVENIENCE
RECEPTACLE: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Box Top Panel (WP 0014)

Materials/Parts

Convenience Receptacle (if continuity is indicated
between terminals)
Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)
Assistant (1)

NOTE

Applicable to MEP-802A only.

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect CONVENIENCE RECEPTACLE (Figure 1, Item 5) for cracks, breaks, corrosion, bent terminals, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Remove control box top panel (WP 0014, Removal).
3. Tag and disconnect CONVENIENCE RECEPTACLE (Figure 1, Item 5) electrical leads.
4. Set multimeter for ohms and check for continuity between upper side terminals and lower side terminals of each plug outlet.
5. Replace CONVENIENCE RECEPTACLE (Figure 1, Item 5) if continuity is indicated between terminals.

TESTING – CONTINUED

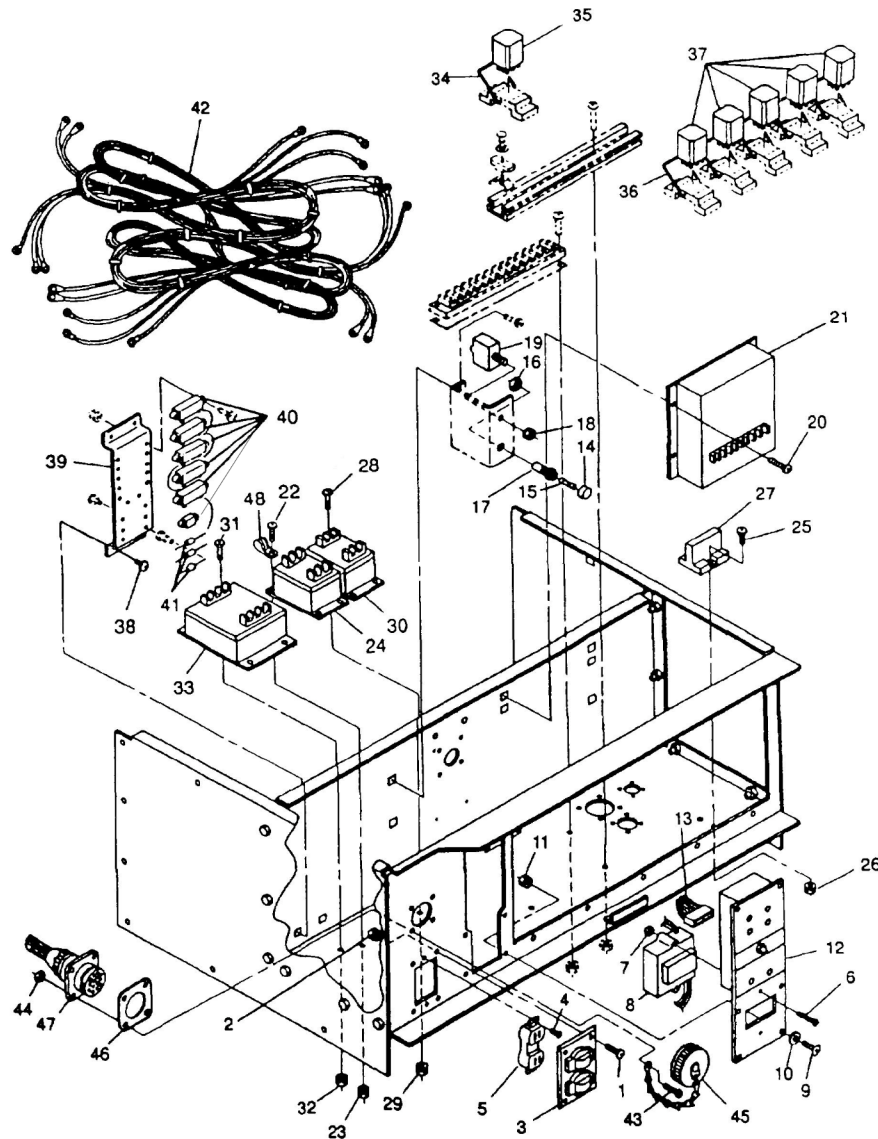


Figure 1. Control Box Components.

6. Connect electrical leads to CONVENIENCE RECEPTACLE (Figure 1, Item 5) and remove tags.
7. Install control box top panel (WP 0014, Installation).

END OF TASK

REMOVAL

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal)
4. Tag and disconnect CONVENIENCE RECEPTACLE (Figure 1, Item 5) electrical leads.
5. Remove screws (Figure 1, Item 1), nuts (Figure 1, Item 2), and cover (Figure 1, Item 3).
6. Remove machine screws (Figure 1, Item 4) and CONVENIENCE RECEPTACLE (Figure 1, Item 5) from control box.

END OF TASK

INSTALLATION**WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install CONVENIENCE RECEPTACLE (Figure 1, Item 5) and secure with machine screws (Figure 1, Item 4).
2. Install cover (Figure 1, Item 3) with screws (Figure 1, Item 1) and nuts (Figure 1, Item 2).
3. Connect electrical leads to CONVENIENCE RECEPTACLE (Figure 1, Item 5) and remove tags.
4. Install control box top panel (WP 0014, Installation).
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, GROUND FAULT CIRCUIT
INTERRUPTER: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

TM-9-6115-641-24P

Convenience Receptacle (WP 0020)

Materials/PartsGround Fault Circuit Interrupter (if indications differ
from testing)

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

Personnel Required

91D (1)

NOTE

Applicable to MEP-802A only.

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) for cracks, loose mounting, frayed wires, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Start and operate generator set at rated voltage and frequency.
2. Press TEST button on GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8).
3. Set multimeter for AC voltage and check for zero voltage at CONVENIENCE RECEPTACLE (WP 0020, Figure 1, Item 5).
4. Press RESET button on GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) and use multimeter to check for 120 VAC at CONVENIENCE RECEPTACLE (WP 0020, Figure 1, Item 5).
5. Replace GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) if indications are other than above.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Tag and disconnect GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) electrical leads.
4. Remove screws (WP 0020, Figure 1, Item 6), and nuts (WP 0020, Figure 1, Item 7), and GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) from malfunction indicator panel (WP 0020, Figure 1, Item 12).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) in malfunction indicator panel (WP 0020, Figure 1, Item 12) with screws (WP 0020, Figure 1, Item 6) and nuts (WP 0020, Figure 1, Item 7).
2. Connect electrical leads and remove tags.
3. Connect negative battery cable and close left side engine access door.

END OF TASK**INSTALLATION****In-Line Fuse****NOTE**

The following procedure applies to generator sets under contract number DAAK01-88-D-0080.

NOTE

When replacing GROUND FAULT CIRCUIT INTERRUPTER, use new GROUND FAULT CIRCUIT INTERRUPTER with integral circuit breaker. Refer to TM 9-6115-641-24P for new part number.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove malfunction indicator panel screws (WP 0020, Figure 1, Item 9), washers (WP 0020, Figure 1, Item 10), and nuts (WP 0020, Figure 1, Item 11). Lay malfunction indicator panel (WP 0020, Figure 1, Item 12) to the side.
4. Cut black wire on load side of GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8).
5. Strip wires on in-line fuse holder (Figure 1, Item 2) and install butt splices (Figure 1, Item 3) at each end. Connect ends of black wire to in-line fuse holder butt splices (Figure 1, Item 3).
6. Install fuse (Figure 1, Item 1) in fuse holder (Figure 1, Item 2).

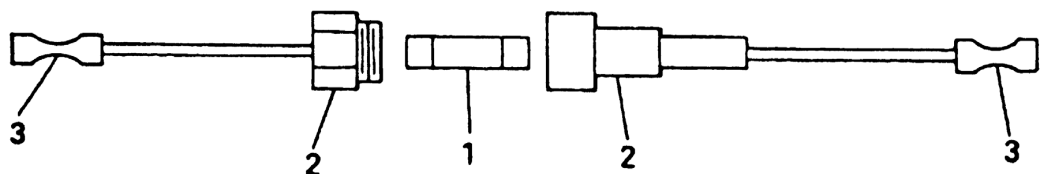


Figure 1. In-Line Fuse Installation.

INSTALLATION – CONTINUED

7. Secure excess wire to wiring harness using tie wrap.
8. Install malfunction indicator panel (WP 0020, Figure 1, Item 12), screws (WP 0020, Figure 1, Item 9), washers (WP 0020, Figure 1, Item 10), and nuts (WP 0020, Figure 1, Item 11).
9. Reconnect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, MALFUNCTION
INDICATOR PANEL: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Convenience Receptacle (WP 0020)

Ground Fault Circuit Interrupter (WP 0021)

Materials/Parts

Malfunction Indicator Panel (if indicators do not illuminate)

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

Personnel Required

91D (1)

Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect malfunction indicator panel (WP 0020, Figure 1, Item 12) for broken indicator lights, cracked housing, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Depress TEST/RESET button and check that all indicators are illuminated.
2. Replace malfunction indicator panel (WP 0020, Figure 1, Item 12) if one or more indicators do not illuminate.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shut off generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Remove GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) (WP 0021, Removal).
5. Disconnect multi-pin connector (WP 0020, Figure 1, Item 13) at rear of malfunction indicator panel (WP 0020, Figure 1, Item 12).
6. Remove screws (WP 0020, Figure 1, Item 9), washers (WP 0020, Figure 1, Item 10), nuts (WP 0020, Figure 1, Item 11), and malfunction indicator panel (WP 0020, Figure 1, Item 12) from control box.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION – CONTINUED

1. Install malfunction indicator panel (WP 0020, Figure 1, Item 12) in control box with screws (WP 0020, Figure 1, Item 9), washers (WP 0020, Figure 1, Item 10), and nuts (WP 0020, Figure 1, Item 11).
2. Install multi-pin connector (WP 0020, Figure 1, Item 13) at rear of panel.
3. Install GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8) (WP 0021, Installation).
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, BATTERY CHARGER
FUSE ASSEMBLY: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

ReferencesControl Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)**Materials/Parts**Gloves & Protective Clothing
New Lockwashers**Equipment Condition**Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect for blown fuse (WP 0020, Figure 1, Item 15).
4. Inspect fuse (WP 0020, Figure 1, Item 15), fuse holder (WP 0020, Figure 1, Item 17), and cap (WP 0020, Figure 1, Item 14) for cracks, corrosion, and obvious damage.
5. Replace defective parts.
6. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Lower control panel and remove fuse (WP 0020, Figure 1, Item 15).
5. Set multimeter for ohms and check continuity across fuse (WP 0020, Figure 1, Item 15).
6. If continuity exists, fuse (WP 0020, Figure 1, Item 15) is good. Otherwise fuse (WP 0020, Figure 1, Item 15) is bad and must be replaced.
7. Install fuse (WP 0020, Figure 1, Item 15), raise and secure control panel.
8. Connect negative battery cable and close left side engine access door.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Remove cap (WP 0020, Figure 1, Item 14) and fuse (WP 0020, Figure 1, Item 15) from fuse holder (WP 0020, Figure 1, Item 17).

REMOVAL – CONTINUED

5. Tag and disconnect electrical leads from fuse holder (WP 0020, Figure 1, Item 17).
6. Remove nut (WP 0020, Figure 1, Item 16) and fuse holder (WP 0020, Figure 1, Item 17).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install fuse holder (WP 0020, Figure 1, Item 17) and secure with nut (WP 0020, Figure 1, Item 16).
2. Connect electrical leads to fuse holder (WP 0020, Figure 1, Item 17) and remove tags.
3. Install fuse (WP 0020, Figure 1, Item 15) and cap (WP 0020, Figure 1, Item 14).
4. Install control box top panel (WP 0014, Installation).
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, DC CONTROL POWER
CIRCUIT BREAKER: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

ReferencesControl Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)**Materials/Parts**Circuit Breaker (if indications defer from testing)
Gloves & Protective Clothing**Equipment Condition**Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19) for cracks, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19) electrical leads.
5. Place circuit breaker in OPEN position.
6. Set multimeter for ohms and connect across circuit breaker terminals. Multimeter should indicate open circuit.
7. Place circuit breaker in CLOSED position. Multimeter should indicate continuity.
8. Replace circuit breaker if indications are not as above.
9. Connect electrical leads to DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19) and remove tags.
10. Raise and secure control panel.

TESTING – CONTINUED

11. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.

REMOVAL – CONTINUED

3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19) electrical leads.
5. Remove nut (WP 0020, Figure 1, Item 18) and remove DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19) from control box.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19) into control box with nut (WP 0020, Figure 1, Item 18).
2. Connect electrical leads and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

**MAINTENANCE OF CONTROL BOX ASSEMBLY, AC VOLTAGE
REGULATOR: INSPECTION, TESTING, REMOVAL, INSTALLATION**
INITIAL SETUP:**Test Equipment**

Multimeter

References

Control Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Materials/Parts

AC voltage regulator (if defective)
Gloves & Protective Clothing

Personnel Required

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect AC voltage regulator (WP 0020, Figure 1, Item 21) for cracked case, broken wires, security, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Remove control box top panel (WP 0014, Removal).
3. Note position of voltage reconnection switch.
4. Start generator set and turn VOLTAGE adjust potentiometer to verify adjustment ranges depending on position of voltage reconnection switch shown in Table 2-9.

Table 1. Voltage Adjustment Range.

VOLTAGE RECONNECTION SWITCH POSITION	ADJUSTMENT RANGE
120/208	205-220 VOLTS
120	114-126 VOLTS
120/240	228-252 VOLTS

5. Shutdown generator set.

TESTING – CONTINUED

6. If no voltage or low voltage was indicated, or voltage adjustment range could not be achieved, perform the following steps. Otherwise, AC voltage regulator (WP 0020, Figure 1, Item 21) is serviceable.
7. Disconnect wire 104C from terminal 6 of AC voltage regulator (WP 0020, Figure 1, Item 21).
8. Set multimeter to VDC and connect positive lead of multimeter to wire 104C. Connect negative lead of multimeter to terminal 5 of AC voltage regulator (WP 0020, Figure 1, Item 21). Start generator set and operate at rated frequency. Move and hold MASTER SWITCH in START position. Multimeter should indicate approximately 8 VDC.
9. Shutdown generator set.
10. Set multimeter for AC volts and connect multimeter to terminals 7 and 8 of AC voltage regulator (WP 0020, Figure 1, Item 21). Start generator set and operate at rated frequency. Move and hold MASTER SWITCH in START position. Multimeter should indicate 67.5 to 82.5 VAC.
11. Shutdown generator set.
12. Set multimeter for AC volts and connect multimeter to terminals 3 and 4 of AC voltage regulator (WP 0020, Figure 1, Item 21). Start generator set and operate at rated frequency. Move and hold MASTER SWITCH in START position. Multimeter should indicate 108 to 132 VAC.
13. Shutdown generator set.
14. Disconnect wire 156A from terminal 1 of AC voltage regulator (WP 0020, Figure 1, Item 21). Set multimeter for ohms and connect positive lead of multimeter to wire 156A and negative lead to terminal 2 of AC voltage regulator (WP 0020, Figure 1, Item 21). Move VOLTAGE adjust potentiometer counterclockwise (CCW) to STOP position. Multimeter should indicate approximately 0 ohms. Move VOLTAGE adjust potentiometer clockwise (CW) slowly while observing multimeter. Multimeter should increase smoothly to approximately 5,000 ohms.
15. If Steps 8, 10, 12, and 14 are as indicated above, AC voltage regulator (WP 0020, Figure 1, Item 21) is defective and must be replaced.
16. Connect all wires previously disconnected.
17. Install control box top panel (WP 0014, Installation).

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top cover (WP 0014, Removal).
4. Tag and disconnect electrical leads to AC voltage regulator (WP 0020, Figure 1, Item 21).
5. Remove screws (WP 0020, Figure 1, Item 20) and AC voltage regulator (WP 0020, Figure 1, Item 21).

END OF TASK**INSTALLATION**

1. Install AC voltage regulator (WP 0020, Figure 1, Item 21) with screws (WP 0020, Figure 1, Item 20).
2. Connect all electrical leads and remove tags.
3. Install control box top cover (WP 0014, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, FREQUENCY
TRANSDUCER: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

ReferencesControl Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)**Materials/Parts**Frequency Transducer (if readings defer from testing)
Gloves & Protective Clothing**Equipment Condition**Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect frequency transducer (WP 0020, Figure 1, Item 24) for cracks, burned or broken terminals, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING****MEP-802A Generator**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Release control panel by turning two fasteners and lower control panel slowly.
5. Disconnect wire 154A from positive (+) terminal of FREQUENCY meter (HERTZ).
6. Set multimeter for DC milliamps (0 to 2 mA range) and connect positive lead to disconnected wire 154A and negative lead to vacant terminal of FREQUENCY meter (HERTZ).
7. Connect negative battery cable and close left side engine access door.
8. Start generator set and adjust frequency to 60 Hz.
9. Multimeter indication should be between 0.080 to 0.120 mA.
10. Adjust frequency to 65 Hz and multimeter indication should be between 0.080 and 0.220 mA.

TESTING – CONTINUED

11. Shutdown generator set.
12. Replace frequency transducer (WP 0020, Figure 1, Item 24) if readings are other than above.
13. If no repair is needed, remove multimeter and connect wire 154A to positive (+) terminal of FREQUENCY meter (HERTZ).
14. Raise and secure control panel.
15. Install control box top panel (WP 0014, Installation).

END OF TASK**TESTING****MEP-812A Generator**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Release control panel by turning two fasteners and lower control panel slowly.
5. Disconnect wire 154A from positive terminal (+) of FREQUENCY meter (HERTZ).
6. Set multimeter for DC milliamps (0 to 2 mA range) and connect positive lead to free end of wire 154A and connect negative lead to positive terminal (+) of FREQUENCY meter (HERTZ).
7. Connect negative battery cable and close left side engine access door.
8. Start and operate generator set at rated voltage and adjust frequency to 400 Hz.
9. Multimeter indication should be between 0.090 to 0.110 mA.
10. Adjust frequency to 420 Hz. Multimeter indication should be between 0.190 and 0.210 mA.
11. Shutdown generator set.
12. Replace frequency transducer (WP 0020, Figure 1, Item 24) if readings are other than above.
13. If no repair is needed, remove multimeter and connect wire 154A to positive terminal (+) of FREQUENCY meter (HERTZ).
14. Raise and secure control panel.
15. Install control box top panel (WP 0014, Installation).

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect frequency transducer (WP 0020, Figure 1, Item 24) electrical leads.
5. Open load terminal board access door to gain access to remove screws (WP 0020, Figure 1, Item 22), nuts (WP 0020, Figure 1, Item 23), cable clamp (WP 0020, Figure 1, Item 48), and frequency transducer (WP 0020, Figure 1, Item 24).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION – CONTINUED

1. Install frequency transducer (WP 0020, Figure 1, Item 24) and cable clamp (WP 0020, Figure 1, Item 48) with screws (WP 0020, Figure 1, Item 22) and nuts (WP 0020, Figure 1, Item 23).
2. Connect all electrical leads and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, SHUNT:
INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Convenience Receptacle (WP 0020)

Materials/Parts

Shunt (if indication defer from testing)
Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect shunt (WP 0020, Figure 1, Item 27) for cracks, burned or broken terminals, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect shunt (WP 0020, Figure 1, Item 27) electrical leads.
5. Set multimeter for ohms and connect to shunt terminals 1 and 4. Multimeter should indicate less than 0.5 ohms.
6. Replace shunt (WP 0020, Figure 1, Item 27) if multimeter indication is greater than above.
7. If no repair is needed, connect electrical leads to shunt (WP 0020, Figure 1, Item 27) and remove tags.
8. Connect negative battery cable and close left side engine access door.
9. Raise and secure control panel.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect shunt (WP 0020, Figure 1, Item 27) electrical leads.
5. Open storage box access door to gain access to remove screws (WP 0020, Figure 1, Item 25), nuts (WP 0020, Figure 1, Item 26), and shunt (WP 0020, Figure 1, Item 27).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install shunt (WP 0020, Figure 1, Item 27) and secure with screws (WP 0020, Figure 1, Item 25) and nuts (WP 0020, Figure 1, Item 26).
2. Connect all electrical leads and remove tags.
3. Raise and secure control panel.
4. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, OVERVOLTAGE
RELAY: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)

Materials/Parts

Overvoltage/Undervoltage Relay (if generator doesn't
comply with testing)
Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect overvoltage relay (WP 0020, Figure 1, Item 30) for cracks, burned or broken terminals, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.

CAUTION

The following procedure disables AC voltage regulator (WP 0020, Figure 1, Item 21) and allows generator to reach an overvoltage condition. Do not allow generator set to operate for an extended period of time in an extreme overvoltage condition.

4. Disconnect wire 006M from terminal 3 of AC voltage regulator (WP 0020, Figure 1, Item 21) and insulate wire end.
5. Connect negative battery cable and close left side engine access door.
6. Start generator set. As generator set accelerates to rated speed, it should instantly shut down and the OVERVOLTAGE lamp on malfunction indicator panel should illuminate. If this does not occur, immediately Shutdown generator set.

TESTING – CONTINUED

7. Replace overvoltage relay (WP 0020, Figure 1, Item 30) if generator set does not operate as above.
8. If no repair is needed, reconnect wire 006M to terminal 3 of AC voltage regulator (WP 0020, Figure 1, Item 21).
9. Raise and secure control panel.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

REMOVAL – CONTINUED

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect overvoltage relay (WP 0020, Figure 1, Item 30) electrical leads.
5. Open load terminal board access door to gain access to remove screws (WP 0020, Figure 1, Item 28), nuts (WP 0020, Figure 1, Item 29), and overvoltage relay (WP 0020, Figure 1, Item 30).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install overvoltage relay (WP 0020, Figure 1, Item 30) with screws (WP 0020, Figure 1, Item 28) and nuts (WP 0020, Figure 1, Item 29).
2. Connect electrical leads and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, SHORT CIRCUIT/
OVERLOAD RELAY: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

ReferencesControl Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)**Materials/Parts**

Gloves & Protective Clothing

Equipment ConditionShutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect short circuit/overload relay (WP 0020, Figure 1, Item 33) for cracks, burned or broken connections, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag, disconnect, and insulate the following wires from short circuit/overload relay (WP 0020, Figure 1, Item 33):
 - Wires 164C and 164B from terminal 1
 - Wires 165C and 165B from terminal 2
 - Wires 166C and 166B from terminal 3
 - Wires 167G and 167D from terminal 4
5. Tag and disconnect wire 104C from terminal 6 on AC voltage regulator (WP 0020, Figure 1, Item 21).

NOTE

Disconnecting wire 104C at AC voltage regulator (WP 0020, Figure 1, Item 21) terminal 6 disables AC voltage regulator and allows generator to develop very low AC output voltage.

6. Connect a jumper wire from terminal 4 of short circuit/overload relay (WP 0020, Figure 1, Item 33) to terminal L0 of load output terminal board.
7. Place voltage reconnection switch in 120/208 voltage position.

TESTING – CONTINUED

8. Obtain low AC voltage with jumper wire between L1 of load terminal board and terminal 1 of short circuit/overload relay (WP 0020, Figure 1, Item 33).
9. Connect negative battery cable and close left side engine access door.
10. Start generator set and operate at rated frequency.
11. Close AC CIRCUIT INTERRUPTER switch. After approximately 1 minute, AC circuit interrupter relay should open and OVERLOAD lamp should illuminate on malfunction indicator panel (WP 0020, Figure 1, Item 12).
12. Shutdown generator set.
13. Disconnect jumper wire from terminal 1 of short circuit/overload relay (WP 0020, Figure 1, Item 33) and connect it to terminal 2.
14. Repeat Steps 10 and 11 above.
15. Shutdown generator set.
16. Disconnect jumper wire from terminal 2 of short circuit/overload relay (WP 0020, Figure 1, Item 33) and connect it to terminal 3.
17. Repeat Steps 10 and 11 above.
18. Shutdown generator set.
19. Move jumper wire from terminal L0 of load terminal board and connect it to L2. Apply low AC voltage obtained with jumper wire between L1 of load terminal board and terminal 3 of short circuit/overload relay (WP 0020, Figure 1, Item 33).
20. Start generator set and operate at rated frequency.
21. Close AC CIRCUIT INTERRUPTER switch. AC circuit interrupter relay should open immediately and SHORT CIRCUIT lamp should illuminate on malfunction indicator panel (WP 0020, Figure 1, Item 12).
22. Shutdown generator set.
23. Disconnect jumper wire from terminal 3 of short circuit/overload relay (WP 0020, Figure 1, Item 33) and connect it to terminal 2.
24. Repeat Steps 20 and 21 above.
25. Shutdown generator set.
26. Disconnect jumper wire from terminal 2 of short circuit/overload relay (WP 0020, Figure 1, Item 33) and connect it to terminal 1.
27. Repeat Steps 20 and 21 above.
28. Shutdown generator set.
29. Replace short circuit/overload relay (WP 0020, Figure 1, Item 33) if any test is not as above.
30. If no repair is needed, remove jumper wires and connect wires to short circuit/overload relay (WP 0020, Figure 1, Item 33), overvoltage relay (WP 0020, Figure 1, Item 30), and AC voltage regulator (WP 0020, Figure 1, Item 21) as tagged. Remove tags.
31. Raise and secure control panel.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect short circuit/overload relay (WP 0020, Figure 1, Item 33) electrical leads.
5. Open load terminal board access door to gain access to remove screws (WP 0020, Figure 1, Item 31), nuts (WP 0020, Figure 1, Item 32), and short circuit/overload relay (WP 0020, Figure 1, Item 33).

END OF TASK

INSTALLATION**WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install short circuit/overload relay (WP 0020, Figure 1, Item 33) with screws (WP 0020, Figure 1, Item 31) and nuts (WP 0020, Figure 1, Item 32).
2. Connect electrical leads and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CRANK DISCONNECT
SWITCH: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistanct (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Convenience Receptacle (WP 0020)

Materials/Parts

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect crank disconnect switch (WP 0020, Figure 1, Item 35) for cracks. Ensure that switch is seated properly.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Set multimeter for VDC and connect positive lead of multimeter to terminal 1 of crank disconnect switch (WP 0020, Figure 1, Item 35). Connect negative lead of multimeter to any generator set ground.
4. Move MASTER SWITCH to either RUN position. Multimeter should indicate nearly 0 volts.
5. Start generator set and operate at rated frequency. Multimeter should indicate 23 to 28 VDC.
6. Replace crank disconnect switch (WP 0020, Figure 1, Item 35) if indications are other than above.
7. Raise and secure control panel.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Release wire clip (WP 0020, Figure 1, Item 34) and remove crank disconnect switch (WP 0020, Figure 1, Item 35) by gently pulling straight up from socket.

END OF TASK

INSTALLATION

1. Install crank disconnect switch (WP 0020, Figure 1, Item 35) and secure with wire clip (WP 0020, Figure 1, Item 34) over switch.
2. Raise and secure control panel.
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, RELAYS:
INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Convenience Receptacle (WP 0020)

Materials/PartsRelay (if indications defer from testing)
Gloves & Protective Clothing**Equipment Condition**Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect relays (WP 0020, Figure 1, Item 37) for cracks, loose mounting, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Remove applicable relay (WP 0020, Figure 1, Item 37) (Removal).
4. Set multimeter for ohms and check for open circuits between terminals 7 and 4, 8 and 5, and 9 and 6. Check for closed circuits between terminals 7 and 1, 8 and 2, and 9 and 3.
5. Connect 24 VDC source to terminals A and B, and listen for audible activation of relay (WP 0020, Figure 1, Item 37). Set multimeter to ohms and check for open circuits between terminals 7 and 1, 8 and 2, and 9 and 3. Check for closed circuits between terminals 7 and 4, 8 and 5, and 9 and 6.
6. Replace relay (WP 0020, Figure 1, Item 37) if indications are other than above.
7. If no repair is needed, install relay (WP 0020, Figure 1, Item 37) (Installation).
8. Raise and secure control panel.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Locate suspected defective relay (WP 0020, Figure 1, Item 37), release wire clip (WP 0020, Figure 1, Item 36), and remove relay (WP 0020, Figure 1, Item 37) by gently pulling from socket.

END OF TASK

INSTALLATION

1. Install relay (WP 0020, Figure 1, Item 37) and secure with wire clip (WP 0020, Figure 1, Item 36).
2. Raise and secure control panel.
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, RESISTOR-DIODE
ASSEMBLY: INSPECTION, TESTING, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

ReferencesControl Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Equipment ConditionShutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Materials/Parts**

Gloves & Protective Clothing

Personnel Required91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect resistor-diode assembly (WP 0020, Figure 1, Item 39) for cracks, breaks, corrosion, bent terminals, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.

NOTE

Isolate component before testing.

4. Set multimeter for ohms and measure resistance across resistors (WP 0020, Figure 1, Item 40) R10, R11, R12, and R13. Multimeter indication should be between 7.0 and 7.8 ohms for each resistor (WP 0020, Figure 1, Item 40).
5. Using multimeter, measure resistance across resistor R14 (WP 0020, Figure 1, Item 40). Multimeter indication should be between 19 and 21 ohms.
6. Using multimeter, measure resistance across resistor R15 (WP 0020, Figure 1, Item 40). Multimeter indication should be between 1,235 and 1,365 ohms.

TESTING – CONTINUED

7. Connect positive lead of multimeter to cathode side and negative lead to anode side of each diode (WP 0020, Figure 1, Item 41) (CR1 and CR2). Refer to Figure 1. Note ohms indication on multimeter for each diode (WP 0020, Figure 1, Item 41).
8. Reverse multimeter leads so positive lead is connected to anode side and negative lead is connected to cathode side of each diode (WP 0020, Figure 1, Item 41) (CR1 and CR2). Note ohms indication on multimeter for each diode (WP 0020, Figure 1, Item 41).
9. Multimeter indications should be 1:10 ratio or greater.
10. If any indication is other than above, replace defective component,.

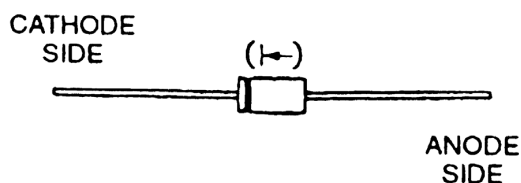


Figure 1. Diode Identification.

11. Raise and secure control panel.
12. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect resistor-diode assembly (WP 0020, Figure 1, Item 39) electrical leads.
5. Remove screws (WP 0020, Figure 1, Item 38) and resistor-diode assembly (WP 0020, Figure 1, Item 39).

END OF TASK**REPAIR**

Repair resistor-diode assembly (WP 0020, Figure 1, Item 39) by replacing resistors (WP 0020, Figure 1, Item 40) and diodes (WP 0020, Figure 1, Item 41).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install resistor-diode assembly (WP 0020, Figure 1, Item 39) and secure with screws (WP 0020, Figure 1, Item 38).
2. Connect all electrical leads and remove tags.

INSTALLATION – CONTINUED

3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL
BOX WIRING HARNESS: INSPECTION, TESTING, REPAIR**

INITIAL SETUP:**Test Equipment**

Multimeter

References

Convenience Receptacle (WP 0020)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Materials/Parts

Gloves & Protective Clothing

Personnel Required

91D (1)
Assistant (1)

Drawings Required

Wiring Diagram (FO-2)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect control box wiring harness (WP 0020, Figure 1, Item 42) for breaks, damaged insulation, and loose or damaged terminals.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Set multimeter for ohms and check wires for continuity, using Wiring Diagram FO-2 as a guide.
5. If no repair is needed, connect negative battery cable and close left side engine access door.
6. Raise and secure control panel.

END OF TASK**REPAIR****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

REPAIR – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Replace individual wires, damaged terminal ends, clamps, and tie wraps.
2. Ensure proper connection of wires not indicating continuity.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL BOX WIRING
HARNESS: REMOVAL, INSPECTION, TESTING, REPAIR, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Heat Resistant Gloves & Additional Protective Clothing

Personnel Required91D (1)
Assistant (1)**References**Control Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)
Crank Disconnect Switch (WP 0030)
Relays (WP 0031)**Equipment Condition**Shutdown Generator Set
Battery Disconnect Switch OFF
ENGINE CONTROL Switch OFF/RESET
DEAD CRANK SWITCH OFF**Drawings Required**

Wiring Diagram (FO-2)

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Open storage box access door and disconnect three electrical connectors at bottom of control box.
5. Remove crank disconnect switch (WP 0030, Removal).
6. Remove relays (WP 0031, Removal)
7. Remove screws (Figure 1, Item 1), washers (Figure 1, Item 2), insulators (Figure 1, Item 3), clips (Figure 1, Item 4), and sockets (Figure 1, Item 5) from track (Figure 1, Item 20).
8. Remove screws (Figure 1, Item 6) and nuts (Figure 1, Item 7) to free terminal board (Figure 1, Item 8).
9. Remove screws (Figure 1, Item 9), nuts (Figure 1, Item 10), and cap (Figure 1, Item 11) to free diagnostic connector (Figure 1, Item 12).
10. Tag and disconnect electrical leads at AC voltage regulator (WP 0020, Figure 1, Item 21), shunt (WP 0020, Figure 1, Item 27), BATTERY CHARGER FUSE assembly (WP 0020, Figure 1, Item 17), DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19), overvoltage relay (WP 0020, Figure 1, Item 30), frequency transducer (WP 0020, Figure 1, Item 24), short circuit/overload relay (WP 0020, Figure 1, Item 33), resistordiode assembly (WP 0020, Figure 1, Item 39), CONVENIENCE RECEPTACLE (WP 0020, Figure 1, Item 5), and GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8).
11. Disconnect electrical connector (Figure 1, Item 13) to malfunction indicator panel (WP 0020, Figure 1, Item 12).
12. Tag and disconnect electrical leads to all indicators, switches, and lights on control panel.
13. Remove screws (Figure 1, Item 14) and nuts (Figure 1, Item 15) to free harness connectors (Figure 1, Items 16, 17, and 18).
14. Remove wiring harness assembly (Figure 1, Item 19) from control box.

END OF TASK**INSPECTION**

1. Inspect control box harness wiring for breaks, damaged insulation, and loose or damaged terminals.
2. Inspect harness connectors, sockets, and terminal board for cracks, corrosion, stripped threads, broken pins, and other visible damage.

END OF TASK**TESTING**

1. Set multimeter for ohms.
2. Check individual wires, connectors, and terminal board for continuity. Refer to Wiring Diagram FO-2 for wire identification.

END OF TASK**REPAIR**

1. Replace damaged cable assemblies, terminals, connectors, sockets, or terminal board.
2. Replace or ensure proper connection of all wires not indicating continuity.

REPAIR – CONTINUED

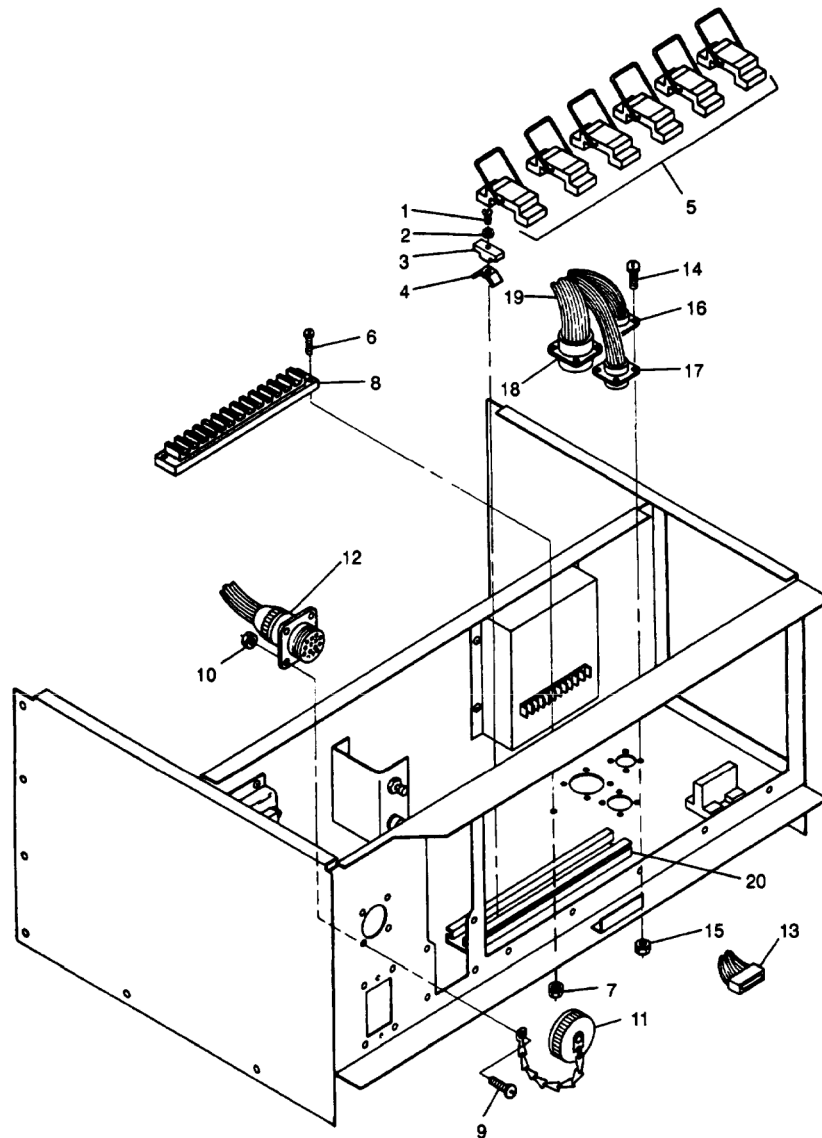


Figure 1. Control Box Wiring Harness.

END OF TASK

INSTALLATION

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

1. Position control box wiring harness assembly (Figure 1, Item 19) in control box.
2. Secure harness connectors (Figure 1, Items 16, 17, and 18) to control box with screws (Figure 1, Item 14) and nuts (Figure 1, Item 15).
3. Connect all electrical leads to control panel indicators, switches, and lights as tagged during removal. Remove tags.
4. Connect electrical connector (WP 0020, Figure 1, Item 13) to malfunction indicator panel (WP 0020, Figure 1, Item 12).
5. Install diagnostic connector (Figure 1, Item 12) and cap (Figure 1, Item 11) with screws (Figure 1, Item 9) and nuts (Figure 1, Item 10).
6. Connect electrical leads, as tagged during removal, to GROUND FAULT CIRCUIT INTERRUPTER (WP 0020, Figure 1, Item 8), CONVENIENCE RECEPTACLE (WP 0020, Figure 1, Item 5), resistor-diode assembly (WP 0020, Figure 1, Item 39), short circuit/overload relay (WP 0020, Figure 1, Item 33), frequency transducer (WP 0020, Figure 1, Item 24), overvoltage relay (WP 0020, Figure 1, Item 30), DC CONTROL POWER circuit breaker (WP 0020, Figure 1, Item 19), BATTERY CHARGER FUSE assembly (WP 0020, Figure 1, Item 17), shunt (WP 0020, Figure 1, Item 27), and AC voltage regulator (WP 0020, Figure 1, Item 21). Remove tags.
7. Secure terminal board (Figure 1, Item 8) to control box with screws (Figure 1, Item 6) and nuts (Figure 1, Item 7).
8. Position sockets (Figure 1, Item 5) on track (Figure 1, Item 20) as tagged during removal.
9. Secure sockets (Figure 1, Item 5) to tracks (Figure 1, Item 20) with clips (Figure 1, Item 4), insulators (Figure 1, Item 3), washers (Figure 1, Item 2), and screws (Figure 1, Item 1). Remove tags.
10. Install relays (WP 0031, Installation).
11. Install crank disconnect switch (WP 0030, Installation).
12. Connect three electrical connectors at bottom of control box and close storage box access door.
13. Install control box top panel (WP 0014, Installation).

INSTALLATION – CONTINUED

14. Connect negative battery cable and close left side engine access door.
15. Start and operate generator set at rated voltage and frequency.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, DIAGNOSTIC
CONNECTOR: INSPECTION, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Protective Clothing

Personnel Required

91D (1)
Assistant (1)

References

Control Box Top Panel (WP 0014)
Convenience Receptacle (WP 0020)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

NOTE

The diagnostic connector (WP 0020, Figure 1, Item 47) can be used as an aid in troubleshooting. Refer to Figure 1 and Table 1.

Diagnostic connector (WP 0020, Figure 1, Item 47) is a component of the control box harness assembly (WP 0020, Figure 1, Item 42), but can be removed and installed separately.

INSPECTION

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Inspect diagnostic connector (WP 0020, Figure 1, Item 47) for cracks, breaks, corrosion, bent terminals, burns, and other damage.
4. Inspect cap (WP 0020, Figure 1, Item 45) for cracks, corrosion, or broken chain.
5. Replace any defective part.
6. If no repair is needed, connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

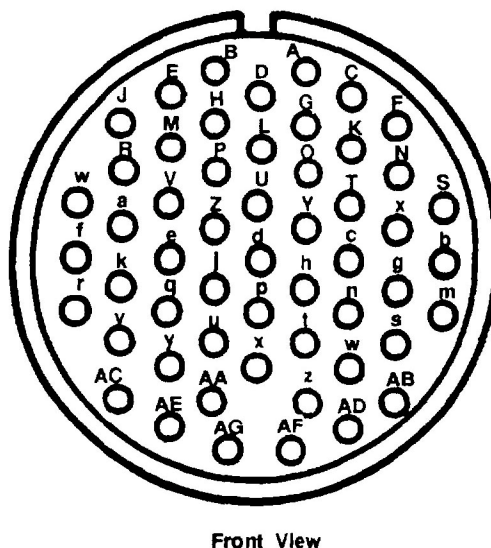


Figure 1. Diagnostic Connector Pin Positions.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Loosen rear outer ring and plastic insert from diagnostic connector (WP 0020, Figure 1, Item 47).
5. Tag and disconnect electrical leads to diagnostic connector (WP 0020, Figure 1, Item 47) by inserting removal tool into pins of connector.
6. Remove screws (WP 0020, Figure 1, Item 43) and nuts (WP 0020, Figure 1, Item 44).
7. Remove diagnostic connector cap (WP 0020, Figure 1, Item 45), diagnostic connector (WP 0020, Figure 1, Item 47), and gasket (WP 0020, Figure 1, Item 46).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install diagnostic connector (WP 0020, Figure 1, Item 47), gasket (WP 0020, Figure 1, Item 46), and cap (WP 0020, Figure 1, Item 45) with screws (WP 0020, Figure 1, Item 43) and nuts (WP 0020, Figure 1, Item 44).

INSTALLATION – CONTINUED

2. Connect electrical leads to diagnostic connector (WP 0020, Figure 1, Item 47) by using insert tool, and remove tags.
3. Install plastic insert and tighten rear outer ring on diagnostic connector (WP 0020, Figure 1, Item 47).
4. Install control box top panel (WP 0014, Installation).
5. Connect negative battery cable and close left side engine access door.

Table 1. Diagnostic Connector Connection Points.

PIN	DESCRIPTION	EXPECTED OUTPUT*
B	AC chassis ground (GND)	Continuity 0 volts (*)
D	DC ground	Continuity 0 volts (*)
F	DC exciter field voltage (positive)	0-45 VDC (4)
J	DC exciter field voltage (negative)	0-45 VDC (5)
K	DC voltage across engine fuel solenoid coil	24 VDC (1)
N	DC starter motor solenoid coil	24 VDC (2 or 6)
O	DC voltage across auxiliary fuel pump	24 VDC (3, 7)
P	DC voltage S1 terminal 7	24 VDC (6)
R	DC voltage S1 terminal 3	24 VDC (1, 3, 6)
T	DC voltage across starter crank relay coil	24 VDC (2 or 6)
U	DC voltage (output of DC circuit breaker)	24 VDC (*)
V	DC voltage across output circuit interrupter coil	24 VDC (*)
X	DC starter motor (motor side of solenoid contacts)	24 VDC (2 or 6)
Z	DC voltage across fuel level contacts	24 VDC (1)
a	DC voltage across low oil pressure switch	0 VDC (1)
b	DC voltage across low oil pressure switch	24 VDC (*)
d	DC battery charging voltage (input to DC circuit breaker)	24-27.6 VDC (*)
*	With generator set operating	
(1)	Place MASTER SWITCH in PRIME/RUN position.	
(2)	Use DEAD CRANK switch in CRANK position.	
(3)	Place MASTER SWITCH in PRIME/RUN AUX FUEL position.	
(4)	Read between pins F and J.	
(5)	Read between pins J and F.	
(6)	During engine starting.	
(7)	Auxiliary fuel pump in operation (note fuel level must be low), MASTER SWITCH in PRIME/RUN position.	

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL PANEL LIGHTS:
INSPECTION, REMOVAL, DISASSEMBLY, ASSEMBLY, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required91D (1)
Assistant (1)**Equipment Condition**Shutdown Generator Set (All Enging to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect control panel lights (Figure 1, Item 3) for cracks, stripped threads, corrosion, and other damage.
4. Raise and secure control panel.

INSPECTION – CONTINUED

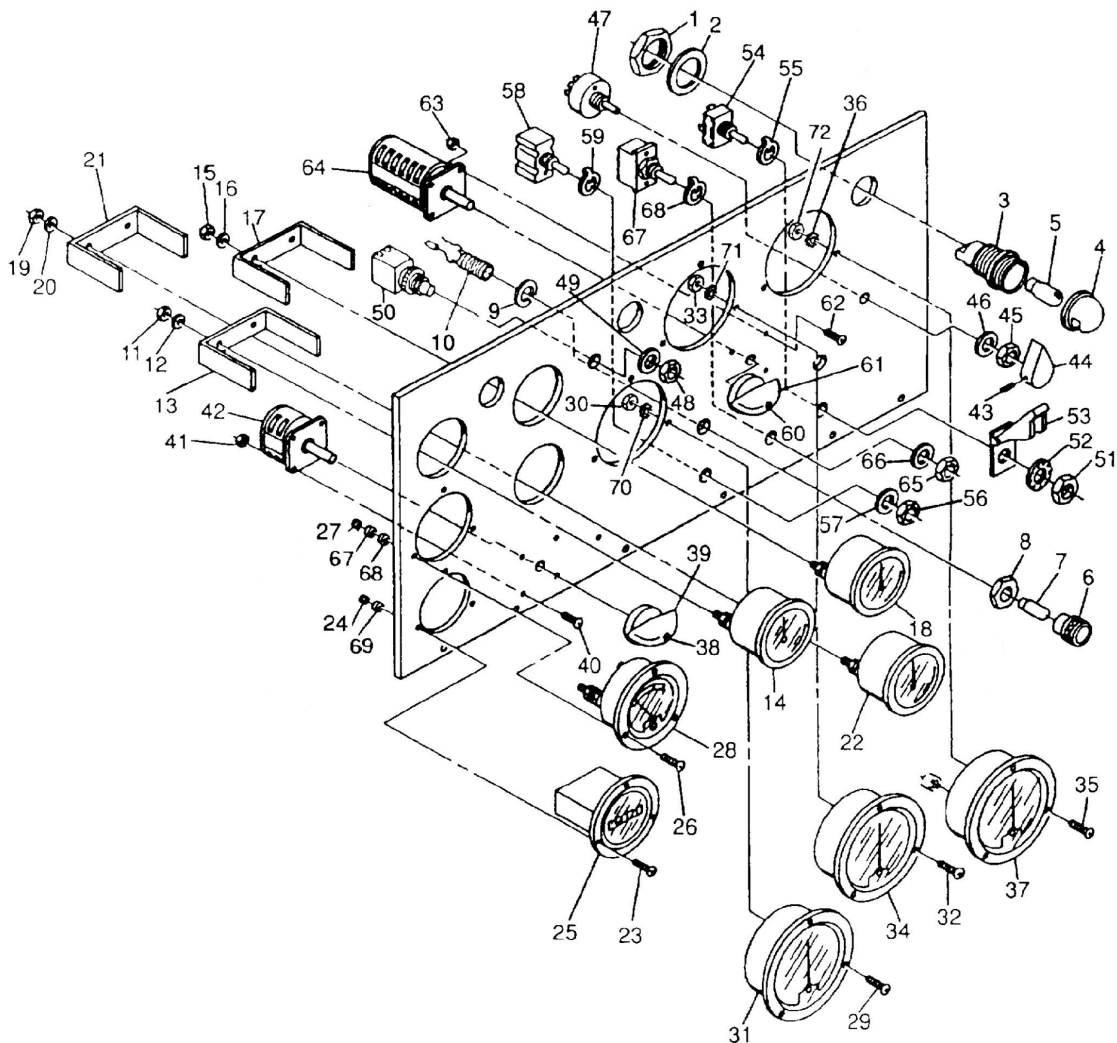


Figure 1. Control Panel Indicators and Switches Lights.

END OF TASK

REMOVAL

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect panel light housing (Figure 1, Item 3) electrical leads.
5. Remove nut (Figure 1, Item 1) and washer (Figure 1, Item 2).
6. Remove panel light housing (Figure 1, Item 3) from control panel.

END OF TASK**DISASSEMBLY****WARNING**

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

DISASSEMBLY – CONTINUED

1. Remove panel light directional cap (Figure 1, Item 4) from panel light housing (Figure 1, Item 3).
2. Remove panel light bulb (Figure 1, Item 5).

END OF TASK**ASSEMBLY**

1. Install panel light bulb (Figure 1, Item 5) into panel light housing (Figure 1, Item 3).
2. Install panel light directional cap (Figure 1, Item 4).

END OF TASK**INSTALLATION**

1. Insert panel light housing (Figure 1, Item 3) into control panel.
2. Install washer (Figure 1, Item 2) and nut (Figure 1, Item 1).
3. Connect panel light housing electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, PRESS-TO-TEST
INDICATOR LIGHTS: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/PartsGloves & Protective Clothing
New Lockwashers**Equipment Condition**Shutdown Generator Set (All Enging to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**91D (1)
Assistanct (1)

INSPECTION

1. Inspect Press-to-Test indicator lights (WP 0036, Figure 1, Item 6) for cracks, corrosion, evidence of shorting, and other damage.
2. Replace or repair Press-to-Test indicator lights or components as necessary.

END OF TASK**TESTING**

1. Place MASTER SWITCH in either PRIME & RUN position.
2. Press in lamp holders (WP 0036, Figure 1, Item 6) and check that lamps are illuminated.
3. If lamp (WP 0036, Figure 1, Item 7) fails to light, set multimeter for VDC and check for battery voltage at receptacle (WP 0036, Figure 1, Item 10) terminals 1 and 3.
4. If voltage is present, replace the press-to-test light assembly.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

4. Tag and disconnect electrical leads to Press-to-Test light receptacles (WP 0036, Figure 1, Item 10).
5. Remove lamp holders (WP 0036, Figure 1, Item 6), nuts (WP 0036, Figure 1, Item 8), lockwashers (WP 0036, Figure 1, Item 9), and receptacles (WP 0036, Figure 1, Item 10) from control panel. Discard lockwashers (WP 0036, Figure 1, Item 9).
6. Remove lamps (WP 0036, Figure 1, Item 7) from lamp holders (WP 0036, Figure 1, Item 6), if necessary.

END OF TASK

INSTALLATION

1. Install press-to-test light receptacles (WP 0036, Figure 1, Item 10) in control panel with new lockwashers (WP 0036, Figure 1, Item 9) and nuts (WP 0036, Figure 1, Item 8).
2. Install lamps (WP 0036, Figure 1, Item 7) in lamp holders (WP 0036, Figure 1, Item 6), if removed.
3. Install lamp holders (WP 0036, Figure 1, Item 6) on receptacles (WP 0036, Figure 1, Item 10).
4. Connect electrical leads and remove tags.
5. Raise and secure control panel.
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, FUEL LEVEL
INDICATOR: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistanct (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

ReferencesConvenience Receptacle (WP 0020)
Control Panel Lights (WP 0036)**Materials/Parts**Gloves & Protective Clothing
New Lockwashers**Equipment Condition**Shutdown Generator Set (All Enging to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Isolate generator set VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) by disconnecting wire 156A at terminal 1 and wire 157B at terminal 2 from AC voltage regulator (WP 0020, Figure 1, Item 21).
5. Set multimeter for ohms and connect between terminals L and R of generator set VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47).
6. Adjust VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) until multimeter indicates 216 to 264 ohms resistance.
7. Remove multimeter, but do not disturb potentiometer adjustment.
8. Disconnect and isolate electrical lead from terminal S of FUEL LEVEL indicator (WP 0036, Figure 1, Item 14).

TESTING – CONTINUED

9. Connect jumper wire between disconnected wire 156A and terminal S of FUEL LEVEL indicator (WP 0036, Figure 1, Item 14).
10. Connect jumper wire between disconnected wire 157B and terminal G of FUEL LEVEL indicator (WP 0036, Figure 1, Item 14).
11. Connect negative battery cable and move generator set MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
12. FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) should indicate EMPTY ($\pm 1/8$ in (3.175 mm)).
13. Move MASTER SWITCH (WP 0036, Figure 1, Item 42) to OFF position and disconnect negative battery cable.
14. Repeat Steps 5 through 7 above, setting VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) between 29.7 and 36.3 ohms.
15. Connect negative battery cable and move MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
16. FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) should indicate FULL ($\pm 1/8$ in (3.175 mm)).
17. Move MASTER SWITCH (WP 0036, Figure 1, Item 42) to OFF position and disconnect negative battery cable.
18. Replace FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) if it fails to function properly.
19. Remove jumper wires and connect electrical leads to FUEL LEVEL indicator (WP 0020, Figure 1, Item 14) and AC voltage regulator (WP 0020, Figure 1, Item 21).
20. Raise and secure control panel.
21. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) electrical leads.
5. Remove nuts (WP 0036, Figure 1, Item 11), washers (WP 0036, Figure 1, Item 12), and clamp (WP 0036, Figure 1, Item 13).
6. Remove FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) from control panel.

END OF TASK**INSTALLATION**

1. Insert FUEL LEVEL indicator (WP 0036, Figure 1, Item 14) into control panel.
2. Install clamp (WP 0036, Figure 1, Item 13), washers (WP 0036, Figure 1, Item 12), and nuts (WP 0036, Figure 1, Item 11).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, COOLANT TEMPERATURE
INDICATOR: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

ReferencesConvenience Receptacle (WP 0020)
Control Panel Lights (WP 0036)**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Equipment ConditionShutdown Generator Set (All Engine to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Materials/Parts**

COOLANT TEMP indicator

Personnel Required91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Isolate generator set VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) by disconnecting wire 156A at terminal 1 and wire 157B at terminal 2 from AC voltage regulator (WP 0020, Figure 1, Item 21).
5. Set multimeter for ohms and connect between terminals L and R of generator set VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47).
6. Adjust VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) until multimeter indicates 117 to 143 ohms resistance.
7. Remove multimeter, but do not disturb potentiometer adjustment.
8. Disconnect and isolate electrical lead from terminal S of COOLANT TEMP indicator (WP 0036, Figure 1, Item 18).

TESTING – CONTINUED

9. Connect jumper wire between disconnected wire 156A and terminal S of COOLANT TEMP indicator (WP 0036, Figure 1, Item 18).
10. Connect jumper wire between disconnected wire 157B and terminal G of COOLANT TEMP indicator (WP 0036, Figure 1, Item 18).
11. Connect negative battery cable and move generator set MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
12. COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) should indicate between 116 and 164 °F (46.6 and 73.3 °C).
13. Move MASTER SWITCH (WP 0036, Figure 1, Item 42) to OFF position and disconnect negative battery cable.
14. Repeat Steps 5 through 7 above, setting potentiometer between 58.5 and 71.5 ohms.
15. Connect negative battery cable and move MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
16. COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) should indicate between 156 and 204 °F (68.8 and 95.5 °C).
17. Move MASTER SWITCH (WP 0036, Figure 1, Item 42) to OFF position and disconnect negative battery cable.
18. Replace COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) if indications are other than above.
19. Remove jumper wires and connect electrical leads to COOLANT TEMP indicator (WP 0020, Figure 1, Item 18) and AC voltage regulator (WP 0020, Figure 1, Item 21).
20. Raise and secure control panel.
21. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) electrical leads.
5. Remove nuts (WP 0036, Figure 1, Item 15), washers (WP 0036, Figure 1, Item 16), and clamp (WP 0036, Figure 1, Item 17).
6. Remove COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert COOLANT TEMP indicator (WP 0036, Figure 1, Item 18) in control panel.
2. Install clamp (WP 0036, Figure 1, Item 17), washers (WP 0036, Figure 1, Item 16), and nuts (WP 0036, Figure 1, Item 15).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, OIL PRESSURE
INDICATOR: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Convenience Receptacle (WP 0020)

Control Panel Lights (WP 0036)

Materials/PartsGloves & Protective Clothing
OIL PRESSURE indicator**Equipment Condition**Shutdown Generator Set (All Engine to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Isolate generator set VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) by disconnecting wire 156A at terminal 1 and wire 157B at terminal 2 from AC voltage regulator (WP 0020, Figure 1, Item 21).
5. Set multimeter for ohms and connect between terminals L and R of generator set VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47).
6. Adjust VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) until multimeter indicates 92.7 to 113.3 ohms resistance.
7. Remove multimeter, but do not disturb potentiometer adjustment.
8. Disconnect and isolate electrical lead from terminal S of OIL PRESSURE indicator (WP 0036, Figure 1, Item 22).
9. Connect jumper wire between disconnected wire 156A and terminal S of OIL PRESSURE indicator (WP 0036, Figure 1, Item 22).

TESTING – CONTINUED

10. Connect jumper wire between disconnected wire 157B and terminal G of OIL PRESSURE indicator (WP 0036, Figure 1, Item 22).
11. Connect negative battery cable and move MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
12. OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) should indicate between 32 and 48 psi.
13. Move MASTER SWITCH (WP 0036, Figure 1, Item 42) to OFF position and disconnect negative battery cable.
14. Repeat Steps 5 through 7 above, setting potentiometer to between 30.1 and 36.8 ohms.
15. Connect negative battery cable and move MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
16. OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) should indicate between 72 and 80 psi.
17. Move MASTER SWITCH (WP 0036, Figure 1, Item 42) to OFF position and disconnect negative battery cable.
18. Replace OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) if it does not function properly.
19. Remove jumper wires and connect electrical leads to OIL PRESSURE indicator (WP 0020, Figure 1, Item 22) and AC voltage regulator (WP 0020, Figure 1, Item 21).
20. Raise and secure control panel.
21. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) electrical leads.
5. Remove nuts (WP 0036, Figure 1, Item 19), washers (WP 0036, Figure 1, Item 20), and clamp (WP 0036, Figure 1, Item 21).
6. Remove OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert OIL PRESSURE indicator (WP 0036, Figure 1, Item 22) into control panel.
2. Install clamp (WP 0036, Figure 1, Item 21), washers (WP 0036, Figure 1, Item 20), and nuts (WP 0036, Figure 1, Item 19).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, TIME METER
(TOTAL HOURS): INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/Parts

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (All Engine to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Release control panel by turning two fasteners and lower control panel slowly.
2. Turn MASTER SWITCH (WP 0036, Figure 1, Item 42) to PRIME & RUN position.
3. Crank engine momentarily to energize time meter relay.
4. Set multimeter for VDC and connect across terminals 1 and 2 of time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25).
5. If 24 VDC is present, wait approximately 6 minutes. Time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25) should move 1/10 of an hour.
6. If time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25) does not operate properly, meter is defective and must be replaced.
7. Disconnect multimeter, raise and secure control panel.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25) electrical leads.
5. Remove screws (WP 0036, Figure 1, Item 23), nuts (WP 0036, Figure 1, Item 24), and lockwashers (WP 0036, Figure 1, Item 69). Discard lockwashers (WP 0036, Figure 1, Item 69).

REMOVAL – CONTINUED

6. Remove time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert time meter (TOTAL HOURS) (WP 0036, Figure 1, Item 25) into control panel.
2. Install screws (WP 0036, Figure 1, Item 23), new lockwashers (WP 0036, Figure 1, Item 69), and nuts (WP 0036, Figure 1, Item 24).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, BATTERY CHARGE
AMMETER: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/Parts

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (All Engine to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

Personnel Required

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Start and operate generator set at rated voltage and frequency.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Set multimeter for VDC and connect across BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28) terminals. Connect positive lead to positive terminal and negative lead to negative terminal if you observe or think battery is charging. Multimeter should indicate up to 50 mV (25 mV equals +10 amps on BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28)).
4. Reverse multimeter leads if you observe or think battery is discharging. Multimeter should indicate up to 25 mV (25 mV equals -10 amps on BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28)).
5. If multimeter indicates millivolt reading and BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28) is not within $\pm 10\%$ of equivalent ampere reading, or ammeter is not indicating, replace BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28).
6. Raise and secure control panel.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28) electrical leads.
5. Remove screws (WP 0036, Figure 1, Item 26), nuts (WP 0036, Figure 1, Item 27), lockwashers (WP 0036, Figure 1, Item 67), and washers (WP 0036, Figure 1, Item 68). Discard lockwashers (WP 0036, Figure 1, Item 67).

REMOVAL – CONTINUED

6. Remove BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert BATTERY CHARGE ammeter (WP 0036, Figure 1, Item 28) into control panel.
2. Install screws (WP 0036, Figure 1, Item 26), washers (WP 0036, Figure 1, Item 68), new lockwashers (WP 0036, Figure 1, Item 67), and nuts (WP 0036, Figure 1, Item 27).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, FREQUENCY
METER (HERTZ): INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Convenience Receptacle (WP 0020)

Control Panel Lights (WP 0036)

Materials/PartsGloves & Protective Clothing

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect FREQUENCY meter (HERTZ) (WP 0036, Figure 1, Item 31) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING****MEP-802A Generator****NOTE**

Test frequency transducer (WP 0020, Figure 2, Item 24) in accordance with WP 0026, Testing prior to testing FREQUENCY meter (HERTZ) (WP 0036, Figure 1, Item 31).

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Disconnect wire 154A from positive (+) terminal of FREQUENCY meter (HERTZ) (WP 0020, Figure 2, Item 31).
5. Set multimeter for DC milliamps and connect positive lead to positive (+) terminal of FREQUENCY meter (HERTZ) (WP 0020, Figure 2, Item 31) and negative lead to wire 154A.
6. Connect negative battery cable, start and operate generator set at rated voltage, and adjust frequency to 60 Hz.
7. Multimeter indication should be between 0.096 and 0.104 DC mA.
8. Replace FREQUENCY meter (HERTZ) (WP 0020, Figure 2, Item 31) if multimeter reading is not as stated above.

TESTING – CONTINUED

9. Raise and secure control panel.

MEP-812A Generator

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Disconnect wire 154A from positive (+) terminal of FREQUENCY meter (HERTZ) (WP 0036, Figure 1, Item 31).
5. Set multimeter for DC milliamps and connect positive lead to positive (+) terminal of FREQUENCY meter (HERTZ) (WP 0020, Figure 2, Item 31) and negative lead to wire 154A.
6. Connect negative battery cable, start and operate generator set at rated voltage, and adjust frequency to 400 Hz.
7. Multimeter indication should be between 0.096 and 0.104 DC mA.
8. Replace FREQUENCY meter (HERTZ) (WP 0020, Figure 1, Item 31) if multimeter reading is not as stated above.
9. Raise and secure control panel.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect FREQUENCY meter (HERTZ) (WP 0036, Figure 1, Item 31) electrical leads.
5. Remove screws (WP 0036, Figure 1, Item 29), nuts (WP 0036, Figure 1, Item 30), and lockwashers (WP 0036, Figure 1, Item 70). Discard lockwashers (WP 0036, Figure 1, Item 70).
6. Remove FREQUENCY meter (HERTZ) (WP 0036, Figure 1, Item 31) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert FREQUENCY meter (HERTZ) (WP 0036, Figure 1, Item 31) into control panel.
2. Install screws (WP 0036, Figure 1, Item 29), new lockwashers (WP 0036, Figure 1, Item 70), and nuts (WP 0036, Figure 1, Item 30).
3. Connect electrical leads. Remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, AMMETER (PERCENT
RATED CURRENT): INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/PartsGloves & Protective Clothing
New Lockwashers**Equipment Condition**Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF**Personnel Required**

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect wire 162A from terminal 1 of ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34).
5. Set multimeter for AC amperes and connect between disconnected wire 162A and terminal 1 of ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34).
6. Connect negative battery cable.
7. Start and operate generator set at rated voltage and frequency, and apply some load to generator set.
8. Observe and note indications on multimeter and ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34).
9. Shutdown generator set.

TESTING – CONTINUED

10. Calculate percent of current from the multimeter indication using the following formula:

$$\text{Percent of current} = \frac{100 \times \text{Multimeter Indication}}{0.75 \text{ amperes}}$$

11. Compare calculated percent of current to ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34) indication noted during operation. If difference is greater than 10%, replace ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34).
12. Disconnect negative battery cable.
13. Remove multimeter and connect wire 162A to terminal 1 of ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34).
14. Raise and secure control panel.
15. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

REMOVAL – CONTINUED**WARNING**

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34) electrical leads.
5. Remove screws (WP 0036, Figure 1, Item 32), nuts (WP 0036, Figure 1, Item 33), and lockwashers (WP 0036, Figure 1, Item 71). Discard lockwashers (WP 0036, Figure 1, Item 71).
6. Remove ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert ammeter (PERCENT RATED CURRENT) (WP 0036, Figure 1, Item 34) into control panel.
2. Install screws (WP 0036, Figure 1, Item 32), new lockwashers (WP 0036, Figure 1, Item 71), and nuts (WP 0036, Figure 1, Item 33).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, AC VOLTMETER
(VOLTS AC): INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/Parts

AC Voltmeter (if readings differ from testing)

Gloves & Protective Clothing

New Lockwashers

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37) for cracked lens, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Set multimeter for AC volts and connect to AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37) terminals.
4. Move voltage reconnection switch (WP 0036, Figure 1, Item 14) to 120/208, 3-phase position.
5. Start and operate generator set at rated voltage and frequency.
6. Move VM-AM transfer switch (WP 0036, Figure 1, Item 64) to L3-L1, 3-phase position. Observe and note indications on multimeter and AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37). Indications on both should be equal, ± 9 volts.
7. Shutdown generator set.
8. Replace AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37) if indications are not as above.
9. Remove multimeter.

TESTING – CONTINUED

10. Raise and secure control panel.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.

REMOVAL – CONTINUED

3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37) electrical leads.
5. Remove screws (WP 0036, Figure 1, Item 35), nuts (WP 0036, Figure 1, Item 72), and lockwashers (WP 0036, Figure 1, Item 36). Discard lockwashers (WP 0036, Figure 1, Item 36).
6. Remove AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert AC voltmeter (VOLTS AC) (WP 0036, Figure 1, Item 37) into control panel.
2. Install screws (WP 0036, Figure 1, Item 35), new lockwashers (WP 0036, Figure 1, Item 36), and nuts (WP 0036, Figure 1, Item 72).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, MASTER
SWITCH: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/Parts

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)
Assistant (1)

Drawings RequiredElectrical Schematic (FO-1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect MASTER SWITCH (WP 0036, Figure 1, Item 42) for loose connections and mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect MASTER SWITCH (WP 0036, Figure 1, Item 42) electrical leads.
5. Check switch for continuity using multimeter. Refer to Electrical Schematic FO-1 (S-1 Circuit Schedule) to determine circuits made to corresponding switch positions.
6. Check continuity until all five positions have been checked.
7. Replace MASTER SWITCH (WP 0036, Figure 1, Item 42) if open circuit is noted in any switch position.
8. Connect electrical leads to MASTER SWITCH (WP 0036, Figure 1, Item 42) and remove tags.
9. Raise and secure control panel.
10. Connect negative battery cable and close left side engine access door.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect MASTER SWITCH (WP 0036, Figure 1, Item 42) electrical leads.
5. Loosen setscrew (WP 0036, Figure 1, Item 38) and remove knob (WP 0036, Figure 1, Item 39).

REMOVAL – CONTINUED

6. Remove screws (WP 0036, Figure 1, Item 40) and nuts (WP 0036, Figure 1, Item 41).
7. Remove MASTER SWITCH (WP 0036, Figure 1, Item 42) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert MASTER SWITCH (WP 0036, Figure 1, Item 42) into control panel.
2. Install screws (WP 0036, Figure 1, Item 40) and nuts (WP 0036, Figure 1, Item 41).
3. Install knob (WP 0036, Figure 1, Item 39) and tighten setscrew (WP 0036, Figure 1, Item 38).
4. Connect electrical leads to MASTER SWITCH (WP 0036, Figure 1, Item 42) and remove tags.
5. Raise and secure control panel.
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, VOLTAGE ADJUST
POTENTIOMETER: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required91D (1)
Assistant (1)**Tools and Special Tools**General Mechanic's Tool Kit (GMTK)
Soldering gun**References**

Control Panel Lights (WP 0036)

Materials/PartsGloves & Protective Clothing
New shrinkable tubing**Equipment Condition**Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) for loose connections and mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Remove VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) (Removal).
2. Set multimeter for ohms and connect across two outer terminals of VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47). Indication shall be 4,500 to 5,500 ohms.
3. Rotate potentiometer shaft counterclockwise (CCW) as far as it will go.
4. Connect multimeter between center terminal and either outer terminal.
5. Slowly and at an even rate, rotate potentiometer shaft clockwise (CW) as far as it will go while observing multimeter.
6. Multimeter indication shall increase at an even rate from 0 to 5,000 ohms.
7. If multimeter indication changes erratically or is not 4,500 to 5,500 ohms when rotation is complete, VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) is defective and must be replaced.
8. If not defective, install VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) (Installation).

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) electrical leads using soldering gun. Remove shrinkable tubing.

REMOVAL – CONTINUED

5. Remove setscrew (WP 0036, Figure 1, Item 43) and knob (WP 0036, Figure 1, Item 44).
6. Remove nut (WP 0036, Figure 1, Item 45) and washer (WP 0036, Figure 1, Item 46).
7. Remove VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) from control panel.

END OF TASK**INSTALLATION**

1. Insert VOLTAGE adjust potentiometer (WP 0036, Figure 1, Item 47) into control panel.
2. Install washer (WP 0036, Figure 1, Item 46) and nut (WP 0036, Figure 1, Item 45).
3. Install knob (WP 0036, Figure 1, Item 44) and setscrew (WP 0036, Figure 1, Item 43).
4. Install new shrinkable tubing and connect electrical leads using soldering gun. Remove tags.
5. Raise and secure control panel.
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, EMERGENCY STOP
SWITCH ASSEMBLY: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/Parts

Gloves & Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Personnel Required

91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect EMERGENCY STOP SWITCH assembly (WP 0036, Figure 1, Item 50) for cracks, loose mounting, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) electrical leads.
5. With switch in normal (out) position, set multimeter for ohms and check circuit between switch terminals. If no continuity is indicated, EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) is defective.
6. Push in EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50).
7. Check for continuity between EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) terminals. Replace EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) if continuity is indicated.
8. Connect electrical leads to EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) and remove tags.
9. Raise and secure control panel.
10. Connect negative battery cable and close left side engine access door.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) electrical leads.
5. Remove nut (WP 0036, Figure 1, Item 48) and washer (WP 0036, Figure 1, Item 49).

REMOVAL – CONTINUED

6. Remove EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Insert EMERGENCY STOP switch assembly (WP 0036, Figure 1, Item 50) into control panel.
2. Install washer (WP 0036, Figure 1, Item 49) and nut (WP 0036, Figure 1, Item 48).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, BATTLE SHORT
SWITCH: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

References

Control Panel Lights (WP 0036)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Materials/Parts

Gloves & Protective Clothing

Personnel Required

91D (1)
Assistant (1)

Drawings Required

Wiring Diagram (FO-2)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect BATTLE SHORT switch (WP 0036, Figure 1, Item 54) for cracks, loose or damaged connections, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect BATTLE SHORT switch (WP 0036, Figure 1, Item 54) electrical leads.
5. Place BATTLE SHORT switch (WP 0036, Figure 1, Item 54) in ON position.

NOTE

Refer to Wiring Diagram FO-2 for terminal positions.

6. Set multimeter for ohms and check for continuity between terminals 2 and 3, 5 and 6, 8 and 9, and 11 and 12.
7. Place BATTLE SHORT switch (WP 0036, Figure 1, Item 54) in OFF position.
8. Check for continuity between terminals 1 and 2, 4 and 5, 7 and 8, and 10 and 11.
9. Replace BATTLE SHORT switch (WP 0036, Figure 1, Item 54) if any open circuit is indicated.

TESTING – CONTINUED

10. Connect electrical leads to BATTLE SHORT switch (WP 0036, Figure 1, Item 54) and remove tags.
11. Raise and secure control panel.
12. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

REMOVAL – CONTINUED

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect BATTLE SHORT switch (WP 0036, Figure 1, Item 54) electrical leads.
5. Remove nut (WP 0036, Figure 1, Item 51), washer (WP 0036, Figure 1, Item 52), and protective cover (WP 0036, Figure 1, Item 53).
6. Remove BATTLE SHORT switch (WP 0036, Figure 1, Item 54) from control panel and tab washer (WP 0036, Figure 1, Item 55) from switch stem.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install tab washer (WP 0036, Figure 1, Item 55) and insert BATTLE SHORT switch (WP 0036, Figure 1, Item 54) into control panel.
2. Install protective cover (WP 0036, Figure 1, Item 53), washer (WP 0036, Figure 1, Item 52), and nut (WP 0036, Figure 1, Item 51).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, AC CIRCUIT INTERRUPTER
SWITCH: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

References

Control Panel Lights (WP 0036)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Materials/Parts

Gloves & Protective Clothing

Personnel Required

91D (1)
Assistant (1)

Drawings Required

Wiring Diagram (FO-2)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) for cracks, loose or damaged connections, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) electrical leads.

NOTE

Refer to Wiring Diagram FO-2 for terminal positions.

5. Set multimeter for ohms and check for continuity between AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) terminals 5 and 4, and terminals 2 and 3.
6. Check for open circuits between terminals 5 and 6, and terminals 1 and 2.
7. Place and hold AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) in CLOSED position.

TESTING – CONTINUED

8. Check for continuity between terminals 5 and 6, and terminals 2 and 3.
9. Check for open circuits between terminals 5 and 4, and terminals 2 and 1.
10. Place and hold AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) in OPEN position.
11. Check for continuity between terminals 5 and 4, and terminals 1 and 2.
12. Check for open circuits between terminals 5 and 6, and terminals 3 and 1.
13. Replace AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) if any continuity check is other than indicated above.
14. Connect electrical leads to AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) and remove tags.
15. Raise and secure control panel.
16. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

REMOVAL – CONTINUED**WARNING**

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) electrical leads.
5. Remove nut (WP 0036, Figure 1, Item 56) and washer (WP 0036, Figure 1, Item 57).
6. Remove AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) from control panel and tab washer (WP 0036, Figure 1, Item 59) from switch stem.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install tab washer (WP 0036, Figure 1, Item 59) onto switch stem and insert AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) into control panel.
2. Install washer (WP 0036, Figure 1, Item 57) and nut (WP 0036, Figure 1, Item 56).
3. Connect electrical leads and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, VM-AM TRANSFER
SWITCH: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

References

Control Panel Lights (WP 0036)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

Materials/Parts

Gloves & Protective Clothing
VM-AM Transfer Switch (if open circuit indicated during testing)

Drawings Required

Electrical Schematic (FO-1)

Personnel Required

91D (1)
Assistant (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect VM-AM transfer switch (WP 0036, Figure 1, Item 64) for cracks, loose or damaged connections, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Remove VM-AM transfer switch (WP 0036, Figure 1, Item 64) (Removal).
3. Set multimeter for ohms and check VM-AM transfer switch (WP 0036, Figure 1, Item 64) for continuity. Refer to Electrical Schematic FO-1 (S-6 Circuit Schedule) to determine circuits made to corresponding switch positions.
4. Check continuity in all six switch positions.
5. Replace VM-AM transfer switch (WP 0036, Figure 1, Item 64) if open circuit is indicated in any switch position.
6. Install VM-AM transfer switch (WP 0036, Figure 1, Item 64) (Installation). Move AC CIRCUIT INTERRUPTER switch (WP 0036, Figure 1, Item 58) to the closed position.

END OF TASK

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect VM-AM transfer switch (WP 0036, Figure 1, Item 64) electrical leads.
5. Loosen setscrew (WP 0036, Figure 1, Item 60) and remove knob (WP 0036, Figure 1, Item 61).

REMOVAL – CONTINUED

6. Remove nuts (WP 0036, Figure 1, Item 63) and screws (WP 0036, Figure 1, Item 62).
7. Remove VM-AM transfer switch (WP 0036, Figure 1, Item 64) from control panel.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Connect electrical leads to VM-AM transfer switch (WP 0036, Figure 1, Item 64) and remove tags.
2. Insert VM-AM transfer switch (WP 0036, Figure 1, Item 64) into control panel.
3. Install screws (WP 0036, Figure 1, Item 62) and nuts (WP 0036, Figure 1, Item 63).
4. Install knob (WP 0036, Figure 1, Item 61) and tighten setscrew (WP 0036, Figure 1, Item 60).
5. Raise and secure control panel.
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF CONTROL BOX ASSEMBLY, PANEL LIGHTS
SWITCH: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Panel Lights (WP 0036)

Materials/Parts

Gloves & Protective Clothing

Panel Lights (if readings do not comply with testing)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

Personnel Required

91D (1)

INSPECTION

1. Shutdown generator set.
2. Release control panel by turning two fasteners and lower control panel slowly.
3. Inspect PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) for cracks, loose or damaged connections, corrosion, and other damage.
4. Raise and secure control panel.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) electrical leads.
5. Set multimeter for ohms and connect between PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) terminals.
6. Place PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) in OFF position. Multimeter should indicate open circuit.
7. Place PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) in ON position. Multimeter should indicate continuity.
8. Replace PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) if readings are not as above.
9. Connect electrical leads to PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) and remove tags.
10. Raise and secure control panel.

TESTING – CONTINUED

11. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.

REMOVAL – CONTINUED

3. Release control panel by turning two fasteners and lower control panel slowly.
4. Tag and disconnect PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) electrical leads.
5. Remove nut (WP 0036, Figure 1, Item 65) and washer (WP 0036, Figure 1, Item 66).
6. Remove PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) from control panel and tab washer (WP 0036, Figure 1, Item 68) from switch stem.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install tab washer (WP 0036, Figure 1, Item 68) onto switch stem and insert PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) into control panel.
2. Install washer (WP 0036, Figure 1, Item 66) and nut (WP 0036, Figure 1, Item 65).
3. Connect electrical leads to PANEL LIGHTS switch (WP 0036, Figure 1, Item 67) terminals and remove tags.
4. Raise and secure control panel.
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL
PANEL: INSPECTION, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Protective Clothing

CARC Paint

Fine Abrasive Paper (WP 0150, Table 1, Item 16)

Personnel Required

91D (1)

Assistant (1)

References

TM-43-0139

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

INSPECTION

1. Shutdown generator set.
2. Release control panel (Figure 1, Item 7) by turning two fasteners and lower control panel (Figure 1, Item 7) slowly.
3. Inspect control panel (Figure 1, Item 7) and hinge (Figure 1, Item 6) for cracks, dents, loose paint, corrosion, and other damage.
4. Raise and secure control panel (Figure 1, Item 7).

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

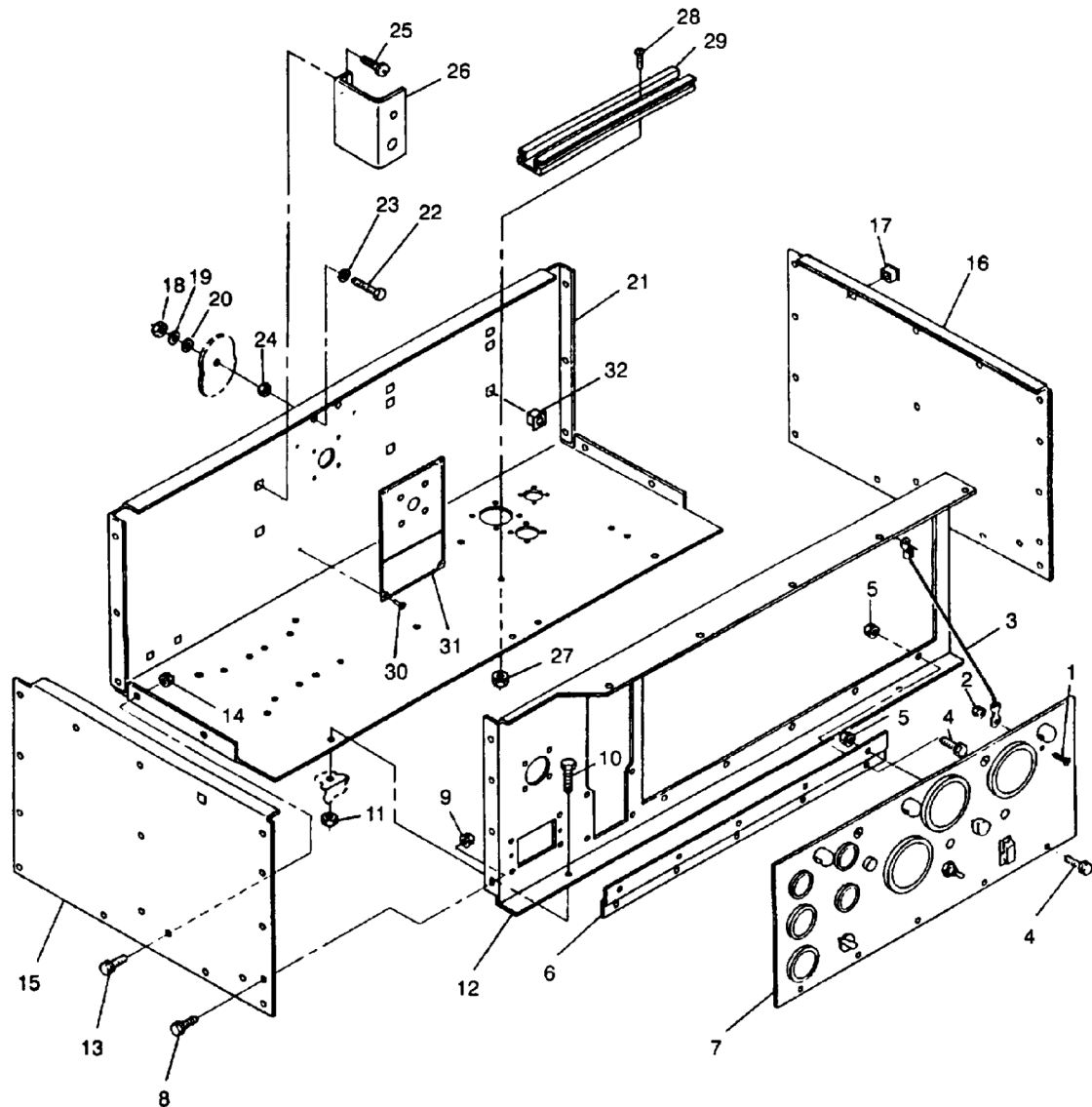


Figure 1. Control Box Housing and Control Panel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Release control panel (Figure 1, Item 7) by turning two fasteners and lower control panel (Figure 1, Item 7) slowly.
4. Tag and disconnect all electrical leads to indicators and switches on control panel (Figure 1, Item 7).
5. Remove screw (Figure 1, Item 1), nut (Figure 1, Item 2), and strap (Figure 1, Item 3).

REMOVAL – CONTINUED

6. Remove bolts (Figure 1, Item 4), nuts (Figure 1, Item 5), hinge (Figure 1, Item 6), and control panel (Figure 1, Item 7) from control box assembly.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

1. Repair all dents and cracks and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surface in accordance with TM 43-0139. (F) Refer to applicable directives.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

1. Install hinge (Figure 1, Item 6) on control panel (Figure 1, Item 7) with bolts (Figure 1, Item 4) and nuts (Figure 1, Item 5).
2. Install control panel (Figure 1, Item 7), with hinge (Figure 1, Item 6) attached, on control box assembly with bolts (Figure 1, Item 4) and nuts (Figure 1, Item 5).
3. Install strap (Figure 1, Item 3) on control panel (Figure 1, Item 7) with screw (Figure 1, Item 1) and nut (Figure 1, Item 2).
4. Connect electrical leads to all indicators and switches and remove tags.
5. Raise and secure control panel (Figure 1, Item 7).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL
PANEL FRAME: REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Protective Clothing

CARC Paint

Fine Abrasive Paper (WP 0150, Table 1, Item 16)

References - cont'd

Control Box Top Panel (WP 0014)

Convenience Receptacle (WP 0020)

Ground Fault Circuit Interrupter (WP 0021)

Malfunction Indicator Panel (WP 0022)

Diagnostic Connector (WP 0035)

Control Panel (WP 0053)

Expendable and Durable Items List (WP 0150)

Personnel Required

91D (1)

Assistant (1)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

ReferencesTM-43-0139

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Remove control panel (WP 0053, Removal).

NOTE

It is not necessary to disconnect electrical leads for components removed in Steps 5 through 7.

5. Remove diagnostic connector (WP 0035, Removal).
6. Remove CONVENIENCE RECEPTACLE (WP 0020, Removal).
7. Remove GROUND FAULT CIRCUIT INTERRUPTER (WP 0021, Removal).
8. Remove malfunction indicator panel (WP 0022, Removal).
9. Remove bolts (WP 0053, Figure 1, Items 8 and 10), nuts (WP 0053, Figure 1, Items 9 and 11), and control panel frame (WP 0053, Figure 1, Item 12).

END OF TASK**INSPECTION**

Inspect control panel frame (WP 0053, Figure 1, Item 12) for dents, cracks, loose paint, and corrosion.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

1. Repair all dents and cracks and remove all loose paint.

REPAIR – CONTINUED

2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surface in accordance with TM 43-0139. (F) Refer to applicable directives.

END OF TASK**INSTALLATION**

1. Install control panel frame (WP 0053, Figure 1, Item 12) on control box assembly with bolts (WP 0053, Figure 1, Items 8 and 10) and nuts (WP 0053, Figure 1, Items 9 and 11).
2. Install malfunction indicator panel (WP 0022, Installation).
3. Install GROUND FAULT CIRCUIT INTERRUPTER (WP 0021, Installation).
4. Install CONVENIENCE RECEPTACLE (WP 0020, Installation).
5. Install diagnostic connector (WP 0035, Installation).
6. Install control panel (WP 0053, Installation)
7. Install control box top panel (WP 0014, Installation).
8. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL BOX
SIDE PANELS: INSPECTION, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves, Protective Clothing & Eyewear

CARC Paint

Fine Abrasive Paper (WP 0150, Table 1, Item 16)

Personnel Required

91D (1)

Assistanct (1)

References

TM-43-0139

Control Box Top Panel (WP 0014)

Control Panel (WP 0053)

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

INSPECTION

1. Inspect control box side panels (WP 0053, Figure 1, Items 15 and 16) for dents, cracks, loose paint, and corrosion.
2. Inspect for missing or damaged cage nuts (WP 0053, Figure 1, Item 17).

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Remove bolts (WP 0053, Figure 1, Items 8 and 13), and nuts (WP 0053, Figure 1, Items 9 and 14).
5. Remove control box side panels (WP 0053, Figure 1, Items 15 and 16).

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

1. Repair all dents and cracks and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surface in accordance with TM 43-0139. (F) Refer to applicable directives.
4. Replace missing or damaged cage nuts (WP 0053, Figure 1, Item 17).

END OF TASK**INSTALLATION**

1. Install control box side panels (WP 0053, Figure 1, Items 15 and 16) with bolts (WP 0053, Figure 1, Items 8 and 13) and nuts (WP 0053, Figure 1, Items 9 and 14).

INSTALLATION – CONTINUED

2. Install control box top panel (WP 0014, Installation).
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF CONTROL BOX ASSEMBLY, CONTROL BOX
TRAY (BOTTOM): REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves, Protective Clothing & Eyewear
CARC Paint
Fine Abrasive Paper (WP 0150, Table 1, Item 16)

Personnel Required

91D (1)
Assistanct (1)

References - cont'd

Frequency Transducer (WP 0026)
Shunt (WP 0027)
Overvoltage Relay (WP 0028)
Short Circuit/Overload Relay (WP 0029)
Crank Disconnect Switch (WP 0030)
Relays (WP 0031)
Resistor-Diode Assembly (WP 0032)
Control Panel (WP 0053)
Control Panel Frame (WP 0054)
Control Box Side Panels (WP 0055)
Expendable and Durable Items List (WP 0150)

References

TM-43-0139
Control Box Top Panel (WP 0014)
Battery Charger Fuse Assembly (WP 0023)
DC Control Power Circuit Breaker (WP 0024)
AC Voltage Regulator (WP 0025)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)
ENGINE CONTROL Switch OFF
DEAD CRANK Switch OFF
Battery Disconnect Switch OFF

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Remove control panel (WP 0053, Removal).
5. Remove control panel frame (WP 0054, Removal).
6. Remove control box side panels (WP 0055, Removal).
7. Remove DC CONTROL POWER circuit breaker (WP 0024, Removal); BATTERY CHARGER FUSE assembly (WP 0023, Removal); AC voltage regulator (WP 0025, Removal); frequency transducer (WP 0026, Removal); shunt (WP 0027 Removal); overvoltage relay (WP 0028, Removal); short circuit/overload relay (WP 0029, Removal); crank disconnect switch (WP 0030, Removal); relays (WP 0031, Removal); and resistor-diode assembly (WP 0032, Removal).
8. Contact next higher maintenance to remove control box wiring harness.
9. Remove nuts (WP 0053, Figure 1, Item 18), lockwashers (WP 0053, Figure 1, Item 19), washers (WP 0053, Figure 1, Item 20), and control box tray (WP 0053, Figure 1, Item 21) from generator set. Discard lock-washer (WP 0053, Figure 1, Item 19).
10. Remove bolts (WP 0053, Figure 1, Item 22), washers (WP 0053, Figure 1, Item 23), and nuts (WP 0053, Figure 1, Item 24) from control box tray (WP 0053, Figure 1, Item 21).
11. Remove screws (WP 0053, Figure 1, Item 25) and controls bracket (WP 0053, Figure 1, Item 26).
12. Remove screws (WP 0053, Figure 1, Item 28), nuts (WP 0053, Figure 1, Item 27), and tracks (WP 0053, Figure 1, Item 29). Drill out rivets (WP 0053, Figure 1, Item 30) and remove voltage reconnection switch plate (WP 0053, Figure 1, Item 31).

END OF TASK**INSPECTION**

1. Inspect control box tray (WP 0053, Figure 1, Item 21) for dents, cracks, loose paint, and corrosion.

INSPECTION – CONTINUED

2. Inspect for missing or damaged cage nuts (WP 0053, Figure 1, Item 32).

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

1. Repair all dents and cracks and remove all loose paint.
2. Remove light corrosion with fine grit abrasive paper (WP 0150, Item 16).
3. Repaint surface in accordance with TM 43-0139. (F) Refer to applicable directives.
4. Replace missing or damaged cage nuts (WP 0053, Figure 1, Item 32).

END OF TASK**INSTALLATION**

1. Install voltage reconnection switch plate (WP 0053, Figure 1, Item 31) with new pop rivets (WP 0053, Figure 1, Item 30).
2. Install bolts (WP 0053, Figure 1, Item 22), washers (WP 0053, Figure 1, Item 23), and nuts (WP 0053, Figure 1, Item 24) in control box tray (WP 0053, Figure 1, Item 21).
3. Install tracks (WP 0053, Figure 1, Item 29) and secure with screws (WP 0053, Figure 1, Item 28) and nuts (WP 0053, Figure 1, Item 27).
4. Install controls bracket (WP 0053, Figure 1, Item 26) with screws (WP 0053, Figure 1, Item 25).
5. Position control box tray (WP 0053, Figure 1, Item 21) in generator set and install washers (WP 0053, Figure 1, Item 20), new lockwashers (WP 0053, Figure 1, Item 19), and nuts (WP 0053, Figure 1, Item 18).
6. Contact next higher maintenance level to install control box harness.
7. Install resistor-diode assembly (WP 0032, Installation); relays (WP 0031, Installation); crank disconnect switch (WP 0030, Installation); short circuit/overload relay (WP 0029, Installation); overvoltage relay (WP 0028, Installation); shunt (WP 0027, Installation); frequency transducer (WP 0026, Installation); AC voltage regulator (WP 0025, Installation); BATTERY CHARGER FUSE assembly (WP 0023, Installation); and DC CONTROL POWER circuit breaker (WP 0024, Installation).
8. Install control box side panels (WP 0055, Installation).
9. Install control panel frame (WP 0054, Installation).
10. Install control panel (WP 0053, Installation).
11. Install control box top panel (WP 0014, Installation).
12. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, OUTPUT BOX ASSEMBLY: INSPECTION, REPAIR**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves, Protective Clothing & Eyewear

CARC Paint

Fine Abrasive Paper (WP 0150, Table 1, Item 16)

Personnel Required

91D (1)

Assistanct (1)

References

TM-43-0139

Control Box Top Panel (WP 0014)

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

ENGINE CONTROL Switch OFF

DEAD CRANK Switch OFF

Battery Disconnect Switch OFF

INSPECTION

1. Shutdown generator set.
2. Remove control box top panel (WP 0014, Removal).
3. Inspect output box panels and tray for cracks, dents, loose paint, and corrosion.
4. Install control box top panel (WP 0014, Installation).

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

1. Repair all dents and cracks and remove all loose paint.
2. Remove light corrosion with fine abrasive paper (WP 0150, Item 16).
3. Repaint surface in accordance with TM 43-0139. (F) Refer to applicable directives.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

MAINTENANCE OF OUTPUT BOX ASSEMBLY, OUTPUT BOX ASSEMBLY: REMOVAL, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)
Assistant (1)

References

TM-9-2815-252-24
Battery Charging Alternator (WP 0012)
Top Housing Panel (WP 0015)
Front Housing Panel (WP 0016)
Control Box Assembly (WP 0019)
Air Restriction Indicator (WP 0068)

References - cont'd

Radiator (WP 0072)
Fuel Level Sender (WP 0078)
Fuel Transfer Pump (WP 0087)
Fuel Filter/Water Separator (WP 0088)
Frequency Adjust Control Cable (WP 0091)
Low Oil Pressure Switch (WP 0092)
Load Output Terminal Board Assembly (WP 0101)

Equipment Condition

Shutdown Generator Set
Battery Disconnect Switch OFF
ENGINE CONTROL Switch OFF/RESET
DEAD CRANK SWITCH OFF

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL

1. Shutdown generator set.
2. Open left side access door and disconnect negative battery cable.
3. Remove control box assembly (WP 0019, Removal).
4. Remove front housing panel (WP 0016, Removal).
5. Tag and disconnect electrical leads from fuel float module (WP 0078, Figure 1, Item 20), fuel level sender (WP 0078, Figure 1, Item 4), and auxiliary fuel pump (WP 0078, Figure 1, Item 54).
6. Open right side engine access door; tag and disconnect electrical leads from heater plugs (TM 9-2815-252-24).
7. Remove clamps (WP 0068, Figure 1, Item 6), clamp (WP 0068, Figure 1, Item 2), and air cleaner assembly.
8. Tag and disconnect electrical leads from starter (including ground wires at mounting bolt), starter solenoid, battery charging alternator (WP 0012, Figure 1, Item 9), and magnetic pickup (WP 0092, Figure 1, Item 7).
9. Remove left fan guard (WP 0072, Removal).

NOTE

Remove DEAD CRANK switch (WP 0092, Figure 1, Item 22) from mounting bracket to disconnect electrical leads.

10. On left side of engine, tag and disconnect electrical leads from fuel transfer pump (WP 0087, Figure 1, Item 6), coolant high temperature switch (WP 0092, Figure 1, Item 5), coolant temperature sender (WP 0092, Figure 1, Item 4), fuel solenoid (WP 0092, Figure 1, Item 17), low oil pressure switch (WP 0092, Figure 1, Item 1), oil pressure sender (WP 0092, Figure 1, Item 2), and DEAD CRANK switch (WP 0092, Figure 1, Item 22).
11. Remove bolt (WP 0092, Figure 1, Item 12), nut (WP 0092, Figure 1, Item 14), and clamps (WP 0092, Figure 1, Items 15 and 23).
12. Tag and disconnect electrical leads from terminals A2, B2, and C2 of AC circuit interrupter relay (WP 0057, Figure 1, Item 4).
13. Tag and disconnect electrical lead from terminal L0 of voltage reconnection switch (WP 0057, Figure 1, Item 14).

REMOVAL – CONTINUED

14. Tag and disconnect ground wire 100E from terminal GND of load output terminal board (WP 0101, Figure 1, Item 13).
15. Remove fuel filter/water separator (WP 0088, Removal).
16. Tag and disconnect main generator leads from terminal board (Figure 1, Item 16).
17. Remove bolts (Figure 1, Items 1 and 3), nuts (Figure 1, Items 2 and 6), washer (Figure 1, Item 4), spacer (Figure 1, Item 5), and output box assembly from generator set. The assembly includes the output box tray (Figure 1, Item 11) and side panels (Figure 1, Items 9 and 10).
18. Remove bolts (Figure 1, Item 7), nuts (Figure 1, Item 8), and side panels (Figure 1, Items 9 and 10) from output box tray (Figure 1, Item 11).

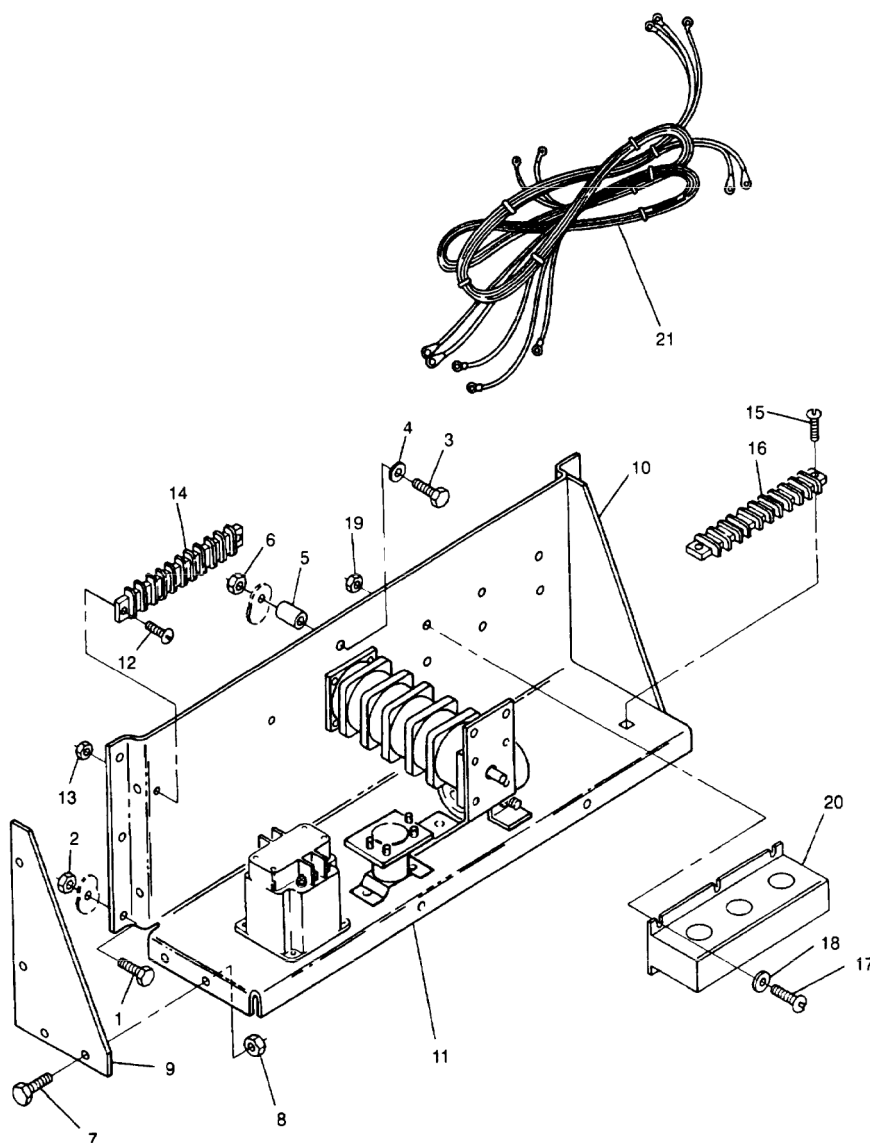


Figure 1. Output Box Assembly.

END OF TASK

INSTALLATION

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

1. Install side panels (Figure 1, Items 9 and 10) on output box tray (Figure 1, Item 11) with bolts (Figure 1, Item 7) and nuts (Figure 1, Item 8).
2. Install output box assembly on generator set with bolts (Figure 1, Items 1 and 3), washer (Figure 1, Item 4), spacer (Figure 1, Item 5), and nuts (Figure 1, Items 2 and 6).
3. Connect main generator electrical leads to terminal board (Figure 1, Item 16) as tagged and remove tags.
4. Connect electrical leads as tagged to terminals A2, B2, and C2 of AC circuit interrupter relay (WP 0057, Figure 1, Item 14) and remove tags.
5. Connect electrical lead to terminal L0 of voltage reconnection switch (WP 0057, Figure 1, Item 14) and remove tag.
6. Connect output/engine harness wire 100E to terminal GND of load output terminal board (WP 0101, Figure 1, Item 13) and remove tag.
7. On left side of engine, connect electrical leads as tagged to DEAD CRANK switch (WP 0092, Figure 1, Item 22), oil pressure sender (WP 0092, Figure 1, Item 2), low oil pressure switch (WP 0092, Figure 1, Item 1), coolant temperature sender (WP 0092, Figure 1, Item 4), fuel solenoid (WP 0091, Figure 1, Item 17), coolant high temperature switch (WP 0092, Figure 1, Item 5), and fuel transfer pump (WP 0087, Figure 1, Item 6). Remove tags.
8. Install clamps (15 and 23, Figure 2-25), bolt (WP 0091, Figure 1, Item 12), and nut (WP 0091, Figure 1, Item 14).
9. Route electrical leads through front air deflector panel (WP 0015, Figure 1, Item 62) and connect electrical leads as tagged to auxiliary fuel pump (WP 0078, Figure 1, Item 54), fuel level sender (WP 0078, Figure 1, Item 4), and fuel float module (WP 0078, Figure 1, Item 20). Remove tags.

INSTALLATION – CONTINUED

10. Install left fan guard (WP 0072, Installation).
11. On right side of engine, connect electrical leads as tagged to magnetic pickup (WP 0092, Figure 1, Item 7), battery charging alternator (WP 0012, Figure 1, Item 9), starter solenoid, starter motor, and engine heater plugs (TM 9-2815-252-24). Remove tags.
12. Install front housing panel (WP 0016, Installation).
13. Install fuel filter/water separator assembly (WP 0088, Installation).
14. Install air cleaner assembly with clamps (WP 0068, Figure 1, Item 6) and clamp (WP 0068, Figure 1, Item 2).
15. Install control box assembly (WP 0019, Installation).
16. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, OUTPUT
BOX/ENGINE WIRING HARNESS: INSPECTION, REPAIR**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Control Box Top Panel (WP 0014)

Personnel Required91D (1)
Assistant (1)**Equipment Condition**Shutdown Generator Set

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION – CONTINUED

1. Shutdown generator set.
2. Remove control box top panel (WP 0014, Removal).
3. Open engine access doors.
4. Inspect wiring harness (Figure 1, Item 1) for burned, bent, corroded, and broken terminals.
5. Inspect connectors for cracks, corrosion, stripped threads, bent or broken pins, and obvious damage.
6. Inspect wire insulation for burns, deterioration, and chafing.
7. Install control box top panel (WP 0014, Installation)
8. Close engine access doors.

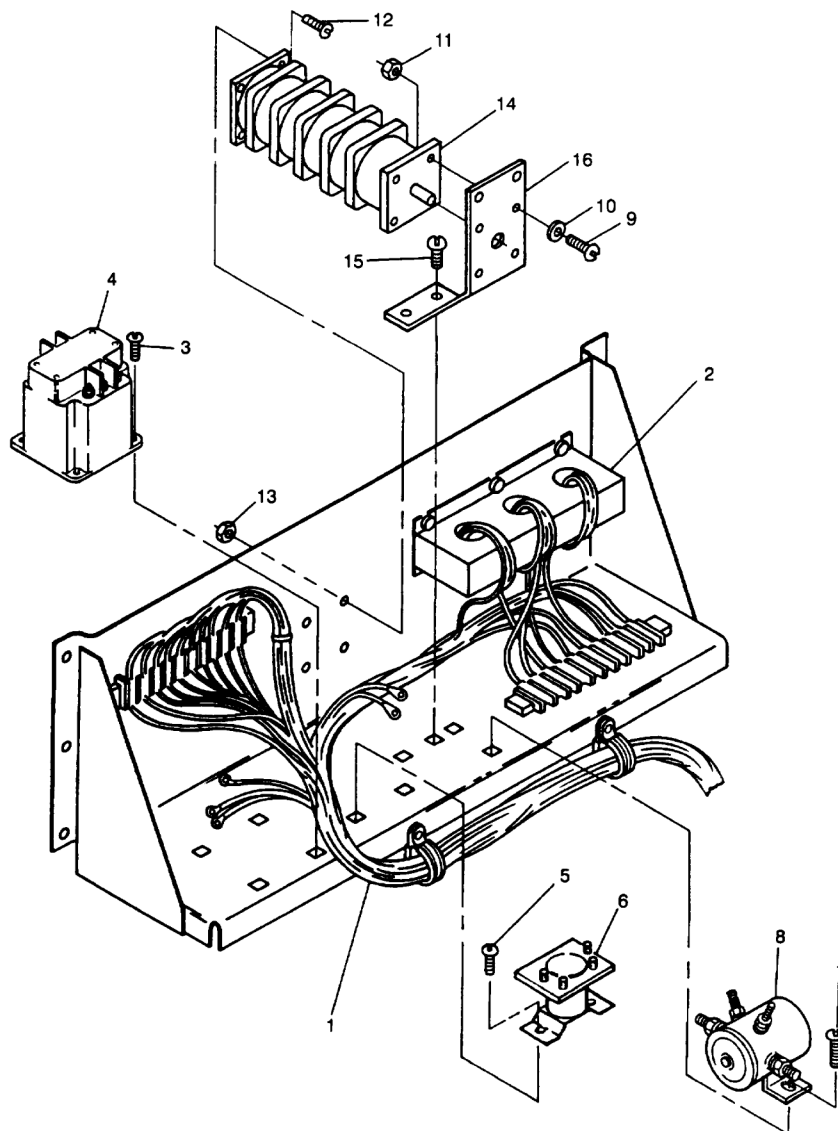


Figure 1. Output Box Assembly.

END OF TASK

REPAIR

1. Replace damaged or broken terminals.
2. Replace damaged or broken connector pins.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, OUTPUT BOX/ENGINE
HARNESS: TESTING, REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Heat Resistant Gloves & Protective Clothing

Personnel Required

91D (1)

Assistant (1)

References

TM-9-2815-252-24

Battery Charging Alternator (WP 0012)

Top Housing Panel (WP 0015)

Front Housing Panel (WP 0016)

References - cont'd

Control Box Assembly (WP 0019)

Output Box/Engine Wiring Harness (WP 0059)

Radiator (WP 0072)

Fuel Level Sender (WP 0078)

Fuel Transfer Pump (WP 0087)

Frequency Adjust Control Cable (WP 0091)

Low Oil Pressure Switch (WP 0092)

Load Output Terminal Board Assembly (WP 0101)

Output Box Assembly (WP 0058)

Equipment Condition

Shutdown Generator Set

Battery Disconnect Switch OFF

ENGINE CONTROL Switch OFF/RESET

DEAD CRANK SWITCH OFF

Drawings Required

Wiring Diagram (FO-2)

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

TESTING

1. Set multimeter for ohms.
2. Check individual wires, connectors, and terminal boards for continuity. Refer to Wiring Diagram FO-2 for wire identification.

END OF TASK**REMOVAL**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box assembly (WP 0019, Removal).
4. Remove front housing panel (WP 0016, Removal). Tag and disconnect electrical leads from fuel float module (WP 0078, Figure 1, Item 20), fuel level sender (WP 0078, Figure 1, Item 4), and auxiliary fuel pump (WP 0078, Figure 1, Item 54).
5. Open right side engine access door. Tag and disconnect electrical leads from engine heater plugs (TM 9-2815-252-24), starter motor (including ground wires at mounting bolt), starter solenoid, battery charging alternator (WP 0012, Figure 1, Item 9), and magnetic pickup (WP 0092, Figure 1, Item 7).
6. Remove left fan guard (WP 0072, Removal).
7. On left side of engine, tag and disconnect electrical leads from fuel transfer pump (WP 0087, Figure 1, Item 6), coolant high temperature switch (WP 0092, Figure 1, Item 5), fuel solenoid (WP 0092, Figure 1, Item 17), coolant temperature sender (WP 0092, Figure 1, Item 4), low oil pressure switch (WP 0092, Figure 1, Item 1), oil pressure sender (WP 0092, Figure 1, Item 2), and DEAD CRANK switch (WP 0092, Figure 1, Item 22).

REMOVAL – CONTINUED

8. Remove bolt (WP 0091, Figure 1, Item 12), nut (WP 0091, Figure 1, Item 14), and clamps (WP 0091, Figure 1, Items 15 and 23).
9. Tag and disconnect electrical leads to AC circuit interrupter relay (WP 0059, Figure 1, Item 4).
10. Tag and disconnect electrical leads to voltage reconnection switch (WP 0059, Figure 1, Item 14).
11. Tag and disconnect electrical leads to pre-heat relay (WP 0059, Figure 1, Item 8).
12. Tag and disconnect electrical leads to cranking relay (WP 0059, Figure 1, Item 6).
13. Open load terminal access door; tag and disconnect wire 100E from terminal GND of load output terminal board (WP 0101, Figure 1, Item 13).
14. Tag and disconnect main generator leads from rear side of terminal board (WP 0058, Figure 1, Item 16).

CAUTION

When removing assembly, use extreme care not to drop attaching hardware down into generator unit. Serious damage to equipment could result.

15. Remove screws (WP 0058, Figure 1, Item 12) and nuts (WP 0058, Figure 1, Item 13) securing terminal board (WP 0058, Figure 1, Item 14) to output box assembly.
16. Remove screws (WP 0058, Figure 1, Item 15) securing terminal board (WP 0058, Figure 1, Item 16) to output box assembly.
17. Remove screws (WP 0058, Figure 1, Item 17), washers (WP 0058, Figure 1, Item 18), nuts (WP 0058, Figure 1, Item 19), current transformer (WP 0058, Figure 1, Item 20), and output box/engine harness (WP 0058, Figure 1, Item 21) from output box assembly and generator set.

END OF TASK**INSPECTION**

1. Remove output box/engine harness (Removal).
2. Inspect wiring harness for burned, bent, corroded, and broken terminals.
3. Inspect connectors for cracks, corrosion, stripped threads, bent or broken pins, and obvious damage.
4. Inspect wire insulation for burns, deterioration, and chafing.
5. Install output box/engine harness (Installation).

END OF TASK**REPAIR**

1. Replace damaged terminals and connectors.
2. Replace wires with damaged insulation and those that do not indicate continuity.

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

1. Position output box/engine harness (WP 0058, Figure 1, Item 21) in output box assembly and generator set.
2. Install current transformer (WP 0058, Figure 1, Item 20) with screws (WP 0058, Figure 1, Item 17), washers (WP 0058, Figure 1, Item 18), and nuts (WP 0058, Figure 1, Item 19).
3. Install terminal board (WP 0058, Figure 1, Item 16) with screws (WP 0058, Figure 1, Item 15).
4. Install terminal board (WP 0058, Figure 1, Item 14) with screws (WP 0058, Figure 1, Item 12) and nuts (WP 0058, Figure 1, Item 13).
5. Connect main generator leads to rear side of terminal board (WP 0058, Figure 1, Item 16) as tagged and remove tags.
6. Connect electrical leads as tagged to pre-heat relay (WP 0059, Figure 1, Item 8), cranking relay (WP 0059, Figure 1, Item 6), voltage reconnection switch (WP 0059, Figure 1, Item 14), and AC circuit interrupter relay (WP 0059, Figure 1, Item 4). Remove tags.
7. Connect wire 100E to GND terminal of load output terminal board (WP 0101, Figure 1, Item 13) and remove tag.
8. On left side of engine, connect electrical leads as tagged to DEAD CRANK switch (WP 0092, Figure 1, Item 22), oil pressure sender (WP 0092, Figure 1, Item 2), low oil pressure switch (WP 0092, Figure 1, Item 1), coolant temperature sender (WP 0092, Figure 1, Item 4), fuel solenoid (WP 0092, Figure 1, Item 17), coolant high temperature switch (WP 0092, Figure 1, Item 5), and fuel transfer pump (WP 0087, Figure 1, Item 6). Remove tags.
9. Route electrical leads through front air deflector panel (WP 0015, Figure 1, Item 62) and connect electrical leads as tagged to auxiliary fuel pump (WP 0078, Figure 1, Item 54), fuel level sender (WP 0078, Figure 1, Item 4), and fuel float module (WP 0078, Figure 1, Item 20). Remove tags.
10. Install clamps (15 and 23, Figure 2-25), bolt (WP 0015, Figure 1, Item 12), and nut (WP 0015, Figure 1, Item 14).
11. Install left fan guard (WP 0072, Installation).
12. On right side of engine, connect electrical leads as tagged to magnetic pickup (WP 0092, Figure 1, Item 7), battery charging alternator (WP 0012, Figure 1, Item 9), starter solenoid, starter motor, and engine heater plugs (TM 9-2815-252-24). Remove tags.

INSTALLATION – CONTINUED

13. Install front housing panel (WP 0016, Installation).
14. Install control box assembly (WP 0019, Installation).
15. Connect negative battery cable and close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, CURRENT TRANSFORMER: INSPECTION, TESTING**

INITIAL SETUP:**Test Equipment**

Multimeter

References

Control Box Top Panel (WP 0014)

Output Box/Engine Wiring Harness (WP 0059)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Shutdown Generator Set

Personnel Required

91D (1)

Assistant (1)

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Remove control box top panel (WP 0014, Removal).
3. Inspect current transformer (WP 0059, Figure 1, Item 2) for cracks, loose or missing hardware, and evidence of overheating.
4. Install control box top panel (WP 0014, Installation).

END OF TASK**TESTING**

1. Shutdown generator set.
2. Remove control box top panel (WP 0014, Removal).
3. Tag and disconnect electrical leads from current transformer (WP 0059, Figure 1, Item 2) secondary terminals.
4. Set multimeter for ohms and check for continuity between current transformer (WP 0059, Figure 1, Item 2) secondary terminals A1 and A2, B1 and B2, and C1 and C2.
5. If continuity is not present, current transformer (WP 0059, Figure 1, Item 2) is defective and must be replaced. Notify next higher level of maintenance.
6. If continuity is present, connect electrical leads to secondary terminals of current transformer (WP 0059, Figure 1, Item 2) and remove tags.
7. Install control box top panel (WP 0014, Installation).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, CURRENT
TRANSFORMER: REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Box Assembly (WP 0019)

Output Box Assembly (WP 0058)

Materials/PartsHeat Resistant Gloves & Protective Clothing
Current transformer**Equipment Condition**Shutdown Generator Set
Battery Disconnect Switch OFF
ENGINE CONTROL Switch OFF/RESET
DEAD CRANK SWITCH OFF**Personnel Required**

91D (1)

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

NOTE

Current transformer (WP 0058, Figure 1, Item 20) is a component of the output box/engine harness assembly, but can be removed and tested separately as follows.

REMOVAL

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box assembly (WP 0019, Removal).
4. Tag and disconnect current transformer (WP 0058, Figure 1, Item 20) electrical leads from secondary terminals.
5. Tag and disconnect main power cables from front side of terminal board (WP 0058, Figure 1, Item 16).

CAUTION

When removing current transformer (WP 0120, Figure 1, Item 20), use extreme care not to drop attaching hardware down into generator unit. Serious damage to equipment could result.

6. Unwrap main power cables from current transformer (WP 0058, Figure 1, Item 20).
7. Remove screws (WP 0058, Figure 1, Item 17), washers (WP 0058, Figure 1, Item 18), nuts (WP 0058, Figure 1, Item 19), and current transformer (WP 0058, Figure 1, Item 20).

END OF TASK**TESTING**

1. Remove current transformer (WP 0058, Figure 1, Item 20) (Removal).
2. Set multimeter for ohms and check for continuity between secondary terminals A1 and A2, B1 and B2, and C1 and C2.
3. If continuity is present, continue with test. If continuity is not present, current transformer (WP 0058, Figure 1, Item 20) is defective and must be replaced.

TESTING – CONTINUED

4. Set up a test circuit using 10 gauge wire (Figure 1). Make ten passes with wire through phase A window.
5. Turn on power source and load bank. Adjust load bank until 18.4 amps is indicated on ammeter.

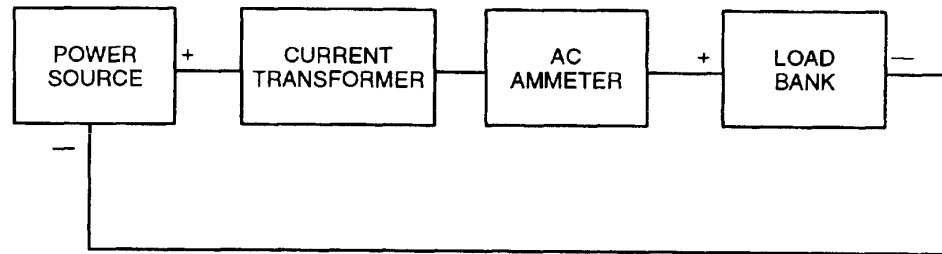


Figure 1. Testing Current Transformer.

6. Set multimeter for amperes and connect to secondary terminals A1 and A2. Multimeter indication must be 0.9 to 1.1 amps.
7. Repeat Steps 4, 5, and 6 above using phase B window and secondary terminals B1 and B2.
8. Repeat Steps 4, 5, and 6 above using phase C window and secondary terminals C1 and C2.
9. Replace current transformer (WP 0058, Figure 1, Item 20) if multimeter indication in any phase is other than stated in Step 6 above.
10. Remove current transformer (WP 0058, Figure 1, Item 20) from test circuit.
11. Install current transformer (WP 0058, Figure 1, Item 20) (Installation).

END OF TASK**INSTALLATION****WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION – CONTINUED**WARNING**

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

CAUTION

When installing current transformer (WP 0120, Figure 1, Item 20), use extreme care not to drop attaching hardware down into generator unit. Serious damage to equipment could result.

1. Install current transformer (WP 0058, Figure 1, Item 20) with screws (WP 0058, Figure 1, Item 17), washers (WP 0058, Figure 1, Item 18), and nuts (WP 0058, Figure 1, Item 19).
2. Wrap main power cables around current transformer (WP 0058, Figure 1, Item 20) as noted during removal.
3. Connect main power cables to front side of terminal board (WP 0058, Figure 1, Item 16). Remove tags.
4. Connect electrical leads to current transformer (WP 0058, Figure 1, Item 20) secondary terminals and remove tags.
5. Install control box assembly (WP 0019, Installation).
6. Connect negative battery cable. Close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, AC CIRCUIT INTERRUPTER
RELAY: INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required - cont'd

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Box Top Panel (WP 0014)
Control Panel Lights (WP 0036)
Output Box/Engine Wiring Harness (WP 0059)

Materials/Parts

AC Circuit Interrupter (if indications defer from testing)

Equipment Condition

Shutdown Generator Set

Personnel Required

91D (1)

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Inspect AC circuit interrupter relay (WP 0059, Figure 1, Item 4) for dents, cracks, and loose or stripped studs.
5. Install control box top panel (WP 0014, Installation).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect AC circuit interrupter relay (WP 0059, Figure 1, Item 4) electrical leads.
5. Remove screws (WP 0059, Figure 1, Item 3) and AC circuit interrupter relay (WP 0059, Figure 1, Item 4) from output box assembly.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Set multimeter for ohms and check for open circuits between AC circuit interrupter relay (WP 0059, Figure 1, Item 4) terminals A1 and A2, B1 and B2, C1 and C2, and 11 and 12.
5. Connect jumper wire from cranking relay (WP 0059, Figure 1, Item 6) terminal A1 to AC circuit interrupter relay (WP 0059, Figure 1, Item 4) terminal X.
6. Connect negative battery cable.
7. Check for closed circuits (continuity) between AC circuit interrupter relay (WP 0059, Figure 1, Item 4) terminals A1 and A2, B1 and B2, C1 and C2, and 11 and 12.

TESTING – CONTINUED

8. Move AC circuit interrupter switch (WP 0036, Figure 1, Item 58) to the open position and disconnect negative battery cable.
9. Replace AC circuit interrupter relay (WP 0059, Figure 1, Item 4) if indications are other than above.
10. If replacement is not needed, remove jumper wire.
11. Install control box top panel (WP 0014, Installation).
12. Connect negative battery cable and close left side engine access door.

END OF TASK**INSTALLATION**

1. Install AC circuit interrupter relay (WP 0059, Figure 1, Item 4) in output box assembly with screws (WP 0036, Figure 1, Item 3).
2. Connect electrical leads to AC circuit interrupter relay (WP 0059, Figure 1, Item 4) and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, CRANKING
RELAY: INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required91D (1)
Assistant (1)**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

ReferencesControl Box Top Panel (WP 0014)
Output Box/Engine Wiring Harness (WP 0059)**Materials/Parts**Cranking Relay (if indications defer from testing)
New Lockwasher**Equipment Condition**Shutdown Generator Set

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Inspect cranking relay (WP 0059, Figure 1, Item 6) for dents, cracks, and loose or stripped studs.
5. Install control box top panel (WP 0014, Installation).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect cranking relay (WP 0059, Figure 1, Item 6) electrical leads.
5. Remove screws (WP 0059, Figure 1, Item 5) and cranking relay (WP 0059, Figure 1, Item 6) from output box assembly.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect wires from terminals X1, X2, and A2 of cranking relay (WP 0059, Figure 1, Item 6).
5. Connect a jumper wire between terminals A1 and X1 of cranking relay (WP 0059, Figure 1, Item 6).
6. Connect negative battery cable.
7. Connect X2 wire disconnected in Step 4 to cranking relay (WP 0059, Figure 1, Item 6) and listen for audible actuation.
8. Set multimeter for ohms and check for continuity between terminals A1 and A2 of cranking relay (WP 0059, Figure 1, Item 6). If no continuity is indicated, cranking relay (WP 0059, Figure 1, Item 6) is defective and must be replaced.

TESTING – CONTINUED

9. Disconnect negative battery cable.
10. If replacement is not needed, remove jumper wire, connect remaining wires to cranking relay (WP 0059, Figure 1, Item 6), and remove all tags.
11. Install control box top panel (WP 0014, Installation).
12. Connect negative battery cable and close left side engine access door.

END OF TASK**INSTALLATION****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Install cranking relay (WP 0059, Figure 1, Item 6) with screws (WP 0059, Figure 1, Item 5) in output box assembly.
2. Connect electrical leads to cranking relay (WP 0059, Figure 1, Item 6) and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, PRE-HEAT
RELAY: INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Control Box Top Panel (WP 0014)

Output Box/Engine Wiring Harness (WP 0059)

Materials/Parts

Pre-heat Relay (if no continuity is indicated)

Equipment ConditionShutdown Generator Set

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Inspect pre-heat relay (WP 0059, Figure 1, Item 8) for dents, cracks, stripped studs, and missing parts.
5. Install control box top panel (WP 0014, Installation).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect electrical leads from pre-heat relay (WP 0059, Figure 1, Item 8).
5. Remove screws (WP 0059, Figure 1, Item 7) and pre-heat relay (WP 0059, Figure 1, Item 8) from output box assembly.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect wires from pre-heat relay (WP 0059, Figure 1, Item 8) terminals 1, 2 and 3. See Figure 1 for terminal positions.
5. Connect a jumper wire between pre-heat relay (WP 0059, Figure 1, Item 8) terminals 1 and 4 (Figure 1).
6. Connect negative battery cable.
7. Connect wire to pre-heat relay (WP 0059, Figure 1, Item 8) terminal 2 disconnected in Step 4 and listen for audible actuation.

TESTING – CONTINUED

8. Set multimeter for ohms and check for continuity between pre-heat relay (WP 0059, Figure 1, Item 8) terminals 3 and 4. If no continuity is indicated pre-heat relay (WP 0059, Figure 1, Item 8) is defective and must be replaced.
9. Disconnect negative battery cable.
10. Remove jumper wire, connect remaining wires to pre-heat relay (WP 0059, Figure 1, Item 8), and remove all tags.
11. Install control box top panel, (WP 0014, Installation).
12. Connect negative battery cable and close left side engine access door.

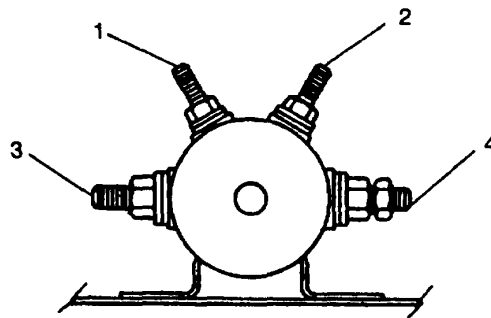


Figure 1. Pre-Heat Relay Terminals.

END OF TASK**INSTALLATION****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Install pre-heat relay (WP 0059, Figure 1, Item 8) in output box with screws (WP 0059, Figure 1, Item 7).
2. Connect electrical leads and remove tags.
3. Install control box top panel (WP 0014, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF OUTPUT BOX ASSEMBLY, VOLTAGE RECONNECTION
SWITCH: INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Safety Goggles & Chemical Gloves

Personnel Required

91D (1)

Assistant (1)

References

Control Box Top Panel (WP 0014)

Output Box/Engine Wiring Harness (WP 0059)

Equipment Condition

Shutdown Generator Set

Drawings Required

Electrical Schematic (FO-1)

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Ensure nuts on ground terminals are properly secured creating a good ground. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Inspect voltage reconnection switch (WP 0059, Figure 1, Item 14) for cracks, missing parts, and loose hardware.
5. Install control box top panel (WP 0014, Installation).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box assembly (WP 0014, Removal).
4. Tag and disconnect electrical leads to voltage reconnection switch (WP 0059, Figure 1, Item 14).

CAUTION

When removing the voltage reconnection switch (WP 0057, Figure 1, Item 14), use extreme care not to drop the attaching hardware down on the generator unit. Serious damage to the equipment could result.

5. Remove screws (WP 0059, Figure 1, Items 9 and 12), washers (WP 0059, Figure 1, Item 10), nuts (WP 0059, Figure 1, Items 11 and 13), and voltage reconnection switch (WP 0059, Figure 1, Item 14) from output box assembly.
6. Remove screws (WP 0059, Figure 1, Item 15) and mounting bracket (WP 0059, Figure 1, Item 16) from output box assembly.

END OF TASK**TESTING**

1. Remove voltage reconnection switch (WP 0059, Figure 1, Item 14) (Removal).
2. Set multimeter for ohms and check voltage reconnection switch (WP 0059, Figure 1, Item 14) for continuity. Refer to Electrical Schematic FO-1 (S-8 Circuit Schedule) to determine switch circuits made to corresponding switch positions.

TESTING – CONTINUED

3. Check continuity of switch circuits in all three switch positions.
4. If open circuit is indicated in any switch position, voltage reconnection switch (WP 0059, Figure 1, Item 14) is defective and must be replaced.
5. If replacement is not required, install voltage reconnection switch (WP 0059, Figure 1, Item 14) (Installation).

END OF TASK**INSTALLATION****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Install mounting bracket (WP 0059, Figure 1, Item 16) with screws (WP 0059, Figure 1, Item 15) in output box assembly.

CAUTION

When removing the voltage reconnection switch (WP 0057, Figure 1, Item 14), use extreme care not to drop the attaching hardware down on the generator unit. Serious damage to the equipment could result.

2. Install voltage reconnection switch (WP 0059, Figure 1, Item 14) in output box assembly and secure with screws (WP 0059, Figure 1, Items 9 and 12), washers (WP 0059, Figure 1, Item 10), and nuts (WP 0059, Figure 1, Items 11 and 13).
3. Connect electrical leads to voltage reconnection switch and remove tags.
4. Install control box assembly (WP 0014, Installation).
5. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF AIR INTAKE AND EXHAUST SYSTEM, MUFFLER:
REMOVAL, CLEANING AND INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves & Protective Clothing
New Lockwashers
Dry cleaning solvent
Stiff bristle brush

References

Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (All System to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.
3. Remove bolts (Figure 1, Item 1) and lockwashers (Figure 1, Item 2) at intake manifold. Discard lockwashers (Figure 1, Item 2).

REMOVAL – CONTINUED

4. Remove bolts (Figure 1, Item 3), lockwashers (Figure 1, Item 4), muffler (Figure 1, Item 5), exhaust seal (Figure 1, Item 6), retaining plate (Figure 1, Item 7), and exhaust seal spring (Figure 1, Item 8) from generator set. Discard lockwashers (Figure 1, Item 4).
5. Remove gasket (Figure 1, Item 9) from exhaust manifold.
6. Unlace safety wire (Figure 1, Item 10) and remove wrap (Figure 1, Item 11) from muffler (Figure 1, Item 5).

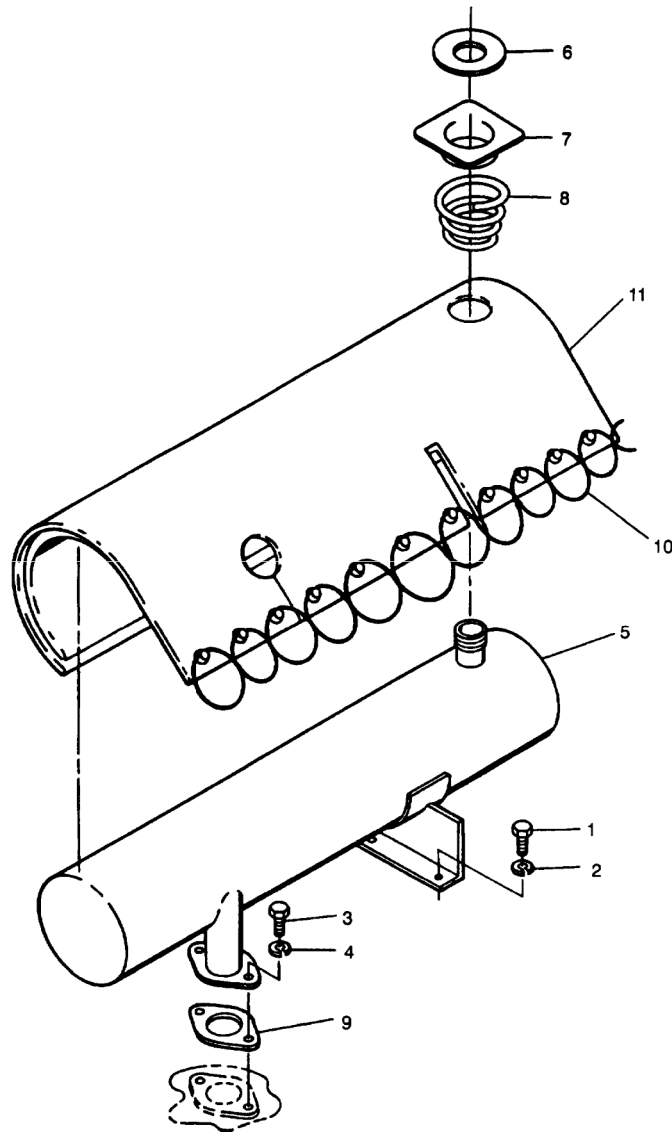


Figure 1. Muffler.

END OF TASK**CLEANING AND INSPECTION**

1. Remove muffler (Figure 1, Item 5) (Removal)

CLEANING AND INSPECTION – CONTINUED**WARNING**

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

2. Clean muffler (Figure 1, Item 5) with stiff bristle brush and dry cleaning solvent (WP 0150, Item 20).
3. Inspect muffler (Figure 1, Item 5) for dents, cracks, excessive corrosion, clogging, and other damage.
4. Inspect wrap (Figure 1, Item 11) for tears, broken or missing cap stands, and other damage.
5. Replace damaged parts.
6. Install muffler (Figure 1, Item 5) (Installation).

END OF TASK**INSTALLATION**

1. Install muffler wrap (Figure 1, Item 11) on muffler (Figure 1, Item 5) with safety wire (Figure 1, Item 10) in a criss-crossing pattern.
2. Install gasket (Figure 1, Item 9), exhaust seal (Figure 1, Item 6), retaining plate (Figure 1, Item 7), exhaust seal spring (Figure 1, Item 8), and muffler (Figure 1, Item 5) at exhaust manifold with new lockwashers (Figure 1, Item 4) and bolts (Figure 1, Item 3).
3. Secure other end of muffler (Figure 1, Item 5) with new lockwashers (Figure 1, Item 2) and bolts (Figure 1, Item 1).
4. Connect negative battery cable.
5. Start generator set and check for exhaust leaks.
6. Shutdown generator set and close both engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF AIR INTAKE AND EXHAUST SYSTEM, AIR
RESTRICTION INDICATOR: INSPECTION, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves (Heat Resistant) & Protective Clothing

Equipment ConditionShutdown Generator Set (All System to Cool)

INSPECTION

1. Shutdown generator set.
2. Open right side engine access door.
3. Inspect air restriction indicator (Figure 1, Item 1) for cracks, stripped threads, or other obvious damage.
4. Close right side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

REMOVAL – CONTINUED

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

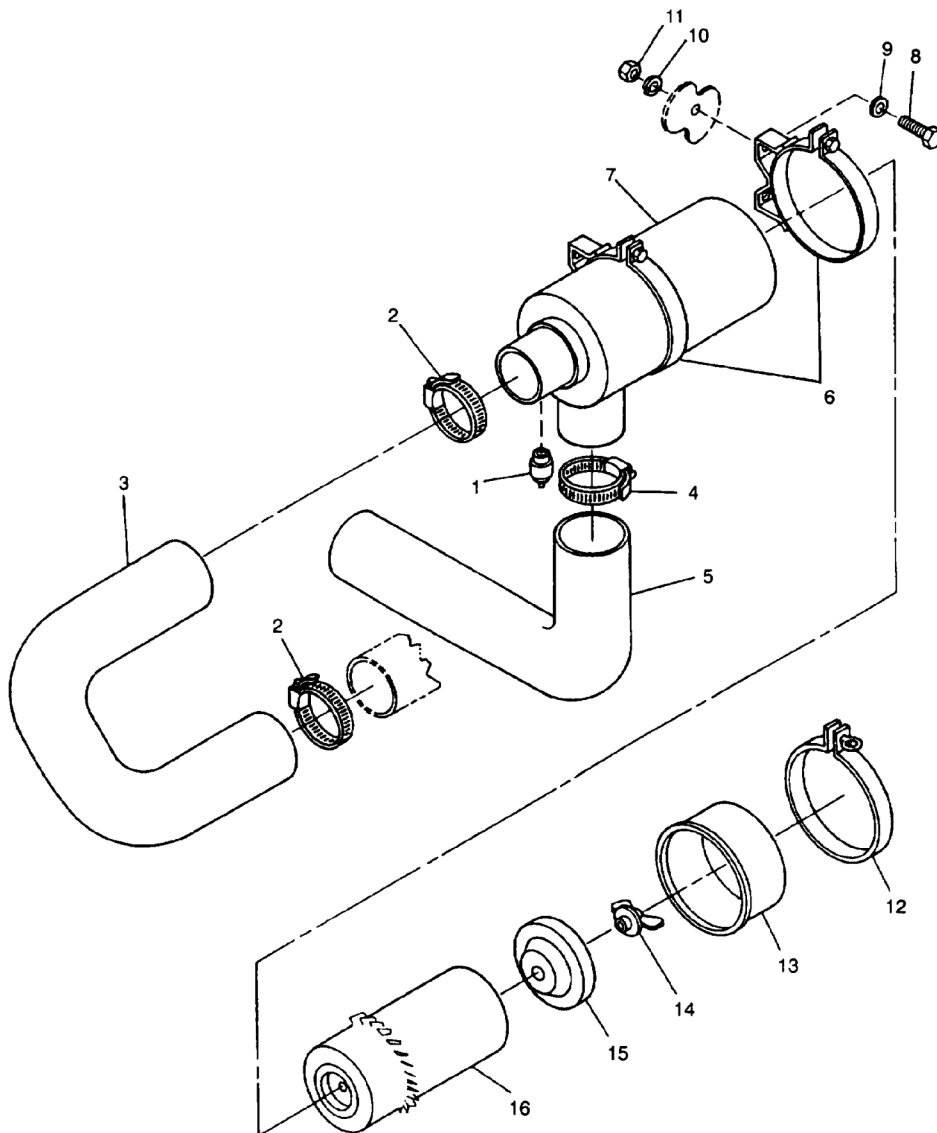


Figure 1. Air Cleaner Assembly.

1. Shutdown generator set.
2. Open right side engine access door.
3. Unscrew and remove air restriction indicator (Figure 1, Item 1) on air cleaner housing (Figure 1, Item 7).

END OF TASK

INSTALLATION

1. Install air restriction indicator (Figure 1, Item 1) on air cleaner housing (Figure 1, Item 7).
2. Hand tighten only.
3. Close right side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

MAINTENANCE OF AIR INTAKE AND EXHAUST SYSTEM, AIR CLEANER ASSEMBLY: REMOVAL, INSPECTION AND SERVICE, REPAIR, INSTALLATION

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves (Heat Resistant) & Protective Clothing
New Lockwashers
Cleaning Cloth (WP 0150, Table 1, Item 9)

References

Control Box Top Panel (WP 0014)
Top Housing Panel (WP 0015)
Air Restriction Indicator (WP 0068)
Air Cleaner Element (WP 0070)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

Personnel Required

91D (1)

REMOVAL

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.

REMOVAL – CONTINUED

3. Loosen clamps (WP 0068, Figure 1, Item 2) and remove hose (WP 0068, Figure 1, Item 3) from air cleaner housing (WP 0068, Figure 1, Item 7) and engine intake.
4. Loosen clamp (WP 0068, Figure 1, Item 4) and remove hose (WP 0068, Figure 1, Item 5) from air cleaner housing (WP 0068, Figure 1, Item 7).
5. Open clamp (WP 0068, Figure 1, Item 6) and remove air cleaner assembly from generator set.
6. Remove air cleaner element (WP 0068, Figure 1, Item 16) (WP 0070, Removal).

CAUTION

Do not permit nuts or bolts on clamps to drop into generator set.

7. Remove control box top panel (WP 0014, Removal) to remove bolts (WP 0068, Figure 1, Item 8) washers (WP 0068, Figure 1, Item 9) lockwashers (WP 0068, Figure 1, Item 10), nuts (WP 0068, Figure 1, Item 11), and clamps (WP 0068, Figure 1, Item 6) from generator set. Discard lockwashers (WP 0068, Figure 1, Item 10).

END OF TASK**SERVICING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove top housing panel (WP 0015, Removal).
4. Inspect air cleaner assembly and mounting clamps (WP 0068, Figure 1, Item 6) for cracks, dents, corrosion, and other damage.
5. Service by replacing air cleaner element (WP 0068, Figure 1, Item 16).
6. Install top housing panel (WP 0015, Installation).
7. Connect negative battery cable and close left side engine access door.

END OF TASK**REPAIR**

Repair by replacing damaged hoses (3 and 5, Figure 2-20) and clamps (2 and 4).

END OF TASK**INSTALLATION**

1. Install clamps (WP 0068, Figure 1, Item 6) on generator set with bolts (WP 0068, Figure 1, Item 8), washers (WP 0068, Figure 1, Item 9), new lockwashers (WP 0068, Figure 1, Item 10), and nuts (WP 0068, Figure 1, Item 11).
2. Install air cleaner element (WP 0068, Figure 1, Item 16) (WP 0070, Installation).
3. Place air cleaner assembly in clamps (WP 0068, Figure 1, Item 6).
4. Position hose (WP 0068, Figure 1, Item 3) on air cleaner housing (WP 0068, Figure 1, Item 7) and intake manifold.
5. Position hose (WP 0068, Figure 1, Item 5) on air cleaner housing (WP 0068, Figure 1, Item 7).

INSTALLATION – CONTINUED

6. Tighten clamps (WP 0068, Figure 1, Item 6) securing air cleaner assembly.
7. Reposition hoses (WP 0068, Figure 1, Items 3 and 5) and tighten clamps (WP 0068, Figure 1, Items 2 and 4).
8. Install control box top panel (WP 0014, Installation).
9. Connect negative battery cable and close both engine access doors.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF AIR INTAKE AND EXHAUST SYSTEM, AIR
CLEANER ELEMENT: REMOVAL, CLEANING, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Air Restriction Indicator (WP 0068)

Expendable and Durable Items List (WP 0150)

Materials/Parts

Gloves (Heat Resistant) & Protective Clothing

Cleaning Cloth (WP 0150, Table 1, Item 7)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

Personnel Required

91D (1)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Top housing panels and exhaust system can get very hot. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door.
3. Loosen clamp (WP 0068, Figure 1, Item 12) and remove cap (WP 0068, Figure 1, Item 13).

REMOVAL – CONTINUED

4. Remove wingnut (WP 0068, Figure 1, Item 14), baffle (WP 0068, Figure 1, Item 15) and air cleaner element (WP 0068, Figure 1, Item 16).

END OF TASK**CLEANING**

1. Remove air cleaner element (WP 0068, Figure 1, Item 16) (Removal).
2. Wipe inside of air cleaner housing (WP 0068, Figure 1, Item 7) with cleaning cloth (WP 0150, Item 7).
3. Inspect air cleaner element (WP 0068, Figure 1, Item 16) for clogs and damage, and replace as necessary.
4. Install air cleaner element (WP 0068, Figure 1, Item 16) (Installation).

END OF TASK**INSTALLATION**

1. Install air cleaner element (WP 0068, Figure 1, Item 16), baffle (WP 0068, Figure 1, Item 15), and wingnut (WP 0068, Figure 1, Item 14).
2. Install cap (WP 0068, Figure 1, Item 13) and tighten clamp (WP 0068, Figure 1, Item 12).
3. Close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF COOLANT SYSTEM, COOLANT SYSTEM: TESTING, SERVICING**

INITIAL SETUP:**Test Equipment**

Pressure tester

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

ReferencesTM-750-254
Radiator (WP 0072)**Materials/Parts**

Goggles, Gloves (Heat Resistant) & Additional Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

TESTING

1. Shutdown generator set.
2. Install coolant system pressure tester in radiator neck.
3. Pump pressure tester until 7 psi is indicated; check coolant system for leaks; and ensure radiator cap (WP 0072, Figure 1, Item 1) releases.
4. Release pressure from pressure tester and remove from radiator neck.

END OF TASK

SERVICING

1. Shutdown generator set.
2. Open right side engine access door.
3. Flush or drain coolant system in accordance with Preventive Cleaning procedures contained in TM 750-254.
4. Close right side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF COOLANT SYSTEM, RADIATOR:
REMOVAL, INSPECTION, CLEANING, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Goggles, Gloves (Heat Resistant) & Additional Protective Clothing
 Fine Grit Abrasive Paper (WP 0150, Table 1, Item 16)
 Dry cleaning solvent (WP 0150, Table 1, Item 20)
 Coolant/Antifreeze
 New lockwashers

References

Service Upon Receipt (WP 0006)
 Top Housing Panel (WP 0015)
 Front Housing Section (WP 0017)
 Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors.
3. Remove top housing panel (WP 0015, Removal).
4. Remove front housing air deflectors (WP 0017, Removal, Steps 4 and 5).
5. Slowly remove radiator cap (Figure 1, Item 1).
6. Remove bolts (Figure 1, Item 2), washers (Figure 1, Item 3), and fan guards (Figure 1, Item 4).

REMOVAL – CONTINUED

7. Remove bolts (Figure 1, Item 5), washers (Figure 1, Item 6), nuts (Figure 1, Item 7), and caution plate (Figure 1, Item 8).
8. Open radiator drain valve (Figure 1, Item 9) and drain coolant/antifreeze into suitable container.
9. Disconnect drain hose (Figure 1, Item 10) and overflow hose (Figure 1, Item 11) at radiator (Figure 1, Item 12).
10. Loosen hose clamps (Figure 1, Item 19) and remove upper coolant hose (Figure 1, Item 20).
11. Loosen hose clamps (Figure 1, Item 21) and remove lower coolant hose (Figure 1, Item 22).
12. Remove bolts (Figure 1, Item 13), nuts (Figure 1, Item 14), and shroud halves (Figure 1, Item 15).
13. Remove bolts (Figure 1, Item 16), lockwashers (Figure 1, Item 17), washers (Figure 1, Item 18), and radiator (Figure 1, Item 12) from generator set. Discard lockwashers (Figure 1, Item 17).
14. Remove drain valve (Figure 1, Item 9) from radiator (Figure 1, Item 12).

REMOVAL – CONTINUED

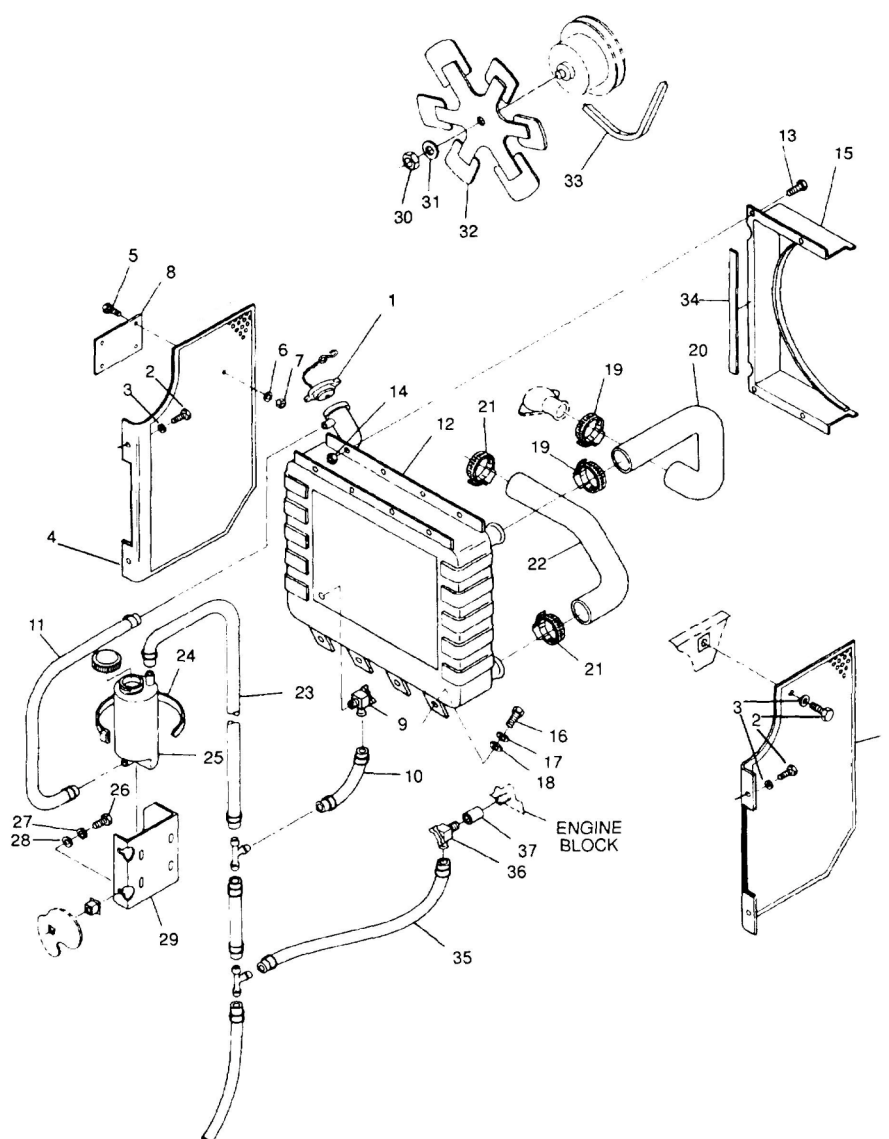


Figure 1. Radiator Assembly and Cooling System.

END OF TASK

INSPECTION

1. Remove radiator (Figure 1, Item 12) (Removal).
2. Inspect radiator (Figure 1, Item 12) for excessive corrosion, cracks, or bent cooling fins.
3. Check inside of radiator (Figure 1, Item 12) for corrosion and scale.
4. Inspect seals (Figure 1, Item 34) for looseness and deterioration.
5. Install radiator (Figure 1, Item 12) (Installation).

END OF TASK**CLEANING****WARNING**

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

WARNING

High pressure steam can blow particles or chemicals into eyes, can cause severe burns, and creates hazardous noise levels. Wear protective eye, skin, and hearing protection when using high pressure steam. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Clean dirt particles from radiator core air passages using filtered, compressed air.
2. Clean exterior surface of radiator with dry cleaning solvent (WP 0150, Item 20).

END OF TASK**REPAIR****WARNING**

Avoid breathing fumes generated by soldering. Eye protection is required. Good general ventilation is normally adequate. Failure to comply with this warning can cause injury to personnel.

1. Replace defective radiator cap (Figure 1, Item 1).
2. Solder minor leaks.
3. Replace damaged seals (Figure 1, Item 34).

END OF TASK**INSTALLATION**

1. Install drain valve (Figure 1, Item 9) in radiator (Figure 1, Item 12).
2. Install radiator (Figure 1, Item 12) in generator set with bolts (Figure 1, Item 16), new lockwashers (Figure 1, Item 17), and washers (Figure 1, Item 18).
3. Install shroud halves (Figure 1, Item 15) with bolts (Figure 1, Item 13) and nuts (Figure 1, Item 14).
4. Install clamps (Figure 1, Item 21) and lower coolant hose (Figure 1, Item 22).
5. Install clamps (Figure 1, Item 19) and upper coolant hose (Figure 1, Item 20).

INSTALLATION – CONTINUED

6. Attach drain hose (Figure 1, Item 10) and overflow hose (Figure 1, Item 11) to radiator (Figure 1, Item 12) and drain valve (Figure 1, Item 9).
7. Install caution plate (Figure 1, Item 8) on right side fan guard (Figure 1, Item 4) with bolts (Figure 1, Item 5), washers (Figure 1, Item 6), and nuts (Figure 1, Item 7).
8. Install fan guards (Figure 1, Item 4) with bolts (Figure 1, Item 2) and washers (Figure 1, Item 3).
9. Install front housing air deflectors (WP 0017, Installation, Steps 23 and 24).
10. Install top housing panel (WP 0015, Installation)
11. Ensure drain valve (Figure 1, Item 9) is closed.
12. Add coolant/antifreeze to proper level (WP 0006, Radiator).
13. Install radiator cap (Figure 1, Item 1).
14. Start generator set and allow unit to reach operating temperature and check for leakage.
15. Add coolant to overflow bottle (Figure 1, Item 25), as required.
16. Close both engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF COOLANT SYSTEM, UPPER COOLANT
HOSE: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGoggles, Gloves & Additional Protective Clothing
Suitable Container for Coolant/Antifreeze Drainage
Coolant/Antifreeze**References**

Radiator (WP 0072)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors.
3. Slowly remove radiator cap (WP 0072, Figure 1, Item 1).
4. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and left side fan guard (WP 0072, Figure 1, Item 4).
5. Loosen clamps (WP 0072, Figure 1, Item 19) and remove upper coolant hose (WP 0072, Figure 1, Item 20).

END OF TASK

INSPECTION

1. Shutdown generator set.
2. Inspect upper coolant hose (WP 0072, Figure 1, Item 20) for cracks, holes, chafing, or other damage.
3. Inspect clamps (WP 0072, Figure 1, Item 19) for cracks, stripped threads, or damage.
4. Replace damaged parts.

END OF TASK**INSTALLATION**

1. Push upper coolant hose (WP 0072, Figure 1, Item 20) onto thermostat housing opening and radiator inlet. Tighten clamps (WP 0072, Figure 1, Item 19).
2. Install left side fan guard (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and washers (WP 0072, Figure 1, Item 3).
3. Install radiator cap (WP 0072, Figure 1, Item 1).
4. Start generator set and allow unit to reach operating temperature and check for leaks.
5. Add coolant/antifreeze to overflow bottle (WP 0072, Figure 1, Item 25), as required.
6. Close both engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
MAINTENANCE OF COOLANT SYSTEM, LOWER
COOLANT HOSE: REMOVAL, INSPECTION, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing
 Suitable Container for Coolant/Antifreeze Drainage
 Coolant/Antifreeze

References

Radiator (WP 0072)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors.
3. Slowly remove radiator cap (WP 0072, Figure 1, Item 1).
4. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and fan guards (WP 0072, Figure 1, Item 4).
5. Open radiator drain valve (WP 0072, Figure 1, Item 9) and drain coolant into suitable container.
6. Loosen clamps (WP 0072, Figure 1, Item 21) and remove lower coolant hose (WP 0072, Figure 1, Item 22).

END OF TASK

INSPECTION

1. Shutdown generator set.
2. Inspect lower coolant hose (WP 0072, Figure 1, Item 22) for cracks, chafing, holes, and other damage.
3. Inspect clamps (WP 0072, Figure 1, Item 21) for cracks, stripped threads, or other damage.
4. Replace damaged parts.

END OF TASK**INSTALLATION**

1. Push lower coolant hose (WP 0072, Figure 1, Item 22) onto radiator outlet opening and water pump opening and tighten clamps (WP 0072, Figure 1, Item 21).
2. Close radiator drain valve (WP 0072, Figure 1, Item 9) and add coolant/antifreeze to proper level (WP 0006, Radiator).
3. Install fan guards (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and washers (WP 0072, Figure 1, Item 3).
4. Install radiator cap (WP 0072, Figure 1, Item 1).
5. Start generator set and allow unit to reach operating temperature and check for leaks.
6. Add coolant/antifreeze to overflow bottle (WP 0072, Figure 1, Item 25), as required. Close engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF COOLANT SYSTEM, COOLANT
RECOVERY SYSTEM: INSPECTION, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGoggles, Gloves & Additional Protective Clothing
New Lockwashers**References**

Radiator (WP 0072)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

INSPECTION**WARNING**

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

In extreme cold weather, skin can stick to metal. Avoid contacting metal items with bare skin in extreme cold weather. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open right side engine access door.
3. Inspect coolant overflow bottle (WP 0072, Figure 1, Item 25) for cracks, holes, or other damage.
4. Inspect overflow bottle mount (WP 0072, Figure 1, Item 29) for cracks, corrosion, or other damage.
5. Replace damaged coolant recovery system components as necessary.
6. Close right side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open right side engine access door.
3. Remove radiator overflow hose (WP 0072, Figure 1, Item 11) at overflow bottle (WP 0072, Figure 1, Item 25) and drain coolant into suitable container.
4. Remove bottle overflow hose (WP 0072, Figure 1, Item 23) at overflow bottle (WP 0072, Figure 1, Item 25).
5. Cut tiedown straps (WP 0072, Figure 1, Item 24) and remove overflow bottle (WP 0072, Figure 1, Item 25) from mount (WP 0072, Figure 1, Item 29).
6. Remove bolts (WP 0072, Figure 1, Item 26), washers (WP 0072, Figure 1, Item 28), lockwashers (WP 0072, Figure 1, Item 27), and mount (WP 0072, Figure 1, Item 29) from generator set. Discard lockwashers (WP 0072, Figure 1, Item 27).

END OF TASK**INSTALLATION****WARNING**

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Install mount (WP 0072, Figure 1, Item 29) on generator set with bolts (WP 0072, Figure 1, Item 26), new lockwashers (WP 0072, Figure 1, Item 27), and washers (WP 0072, Figure 1, Item 28).
2. Position coolant overflow bottle (WP 0072, Figure 1, Item 25) in mount (WP 0072, Figure 1, Item 29) and secure with new tiedown straps (WP 0072, Figure 1, Item 24).
3. Install bottle overflow hose (WP 0072, Figure 1, Item 23) on overflow bottle (WP 0072, Figure 1, Item 25).
4. Install radiator overflow hose (WP 0072, Figure 1, Item 11) on overflow bottle (WP 0072, Figure 1, Item 25).

INSTALLATION – CONTINUED

5. Fill overflow bottle (WP 0072, Figure 1, Item 25) with coolant to the COLD level. Refer to Table 2-1 for proper coolant.
6. Start generator set, check for leaks, and run until normal operating temperature is reached.
7. Add coolant as required to overflow bottle (WP 0072, Figure 1, Item 25).
8. Close right side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF COOLANT SYSTEM, COOLING FAN: INSPECTION, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Goggles, Gloves (Rubber) & Additional Protective
Clothing
Hearing Protection
New Lockwashers

References

Radiator (WP 0072)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

INSPECTION**WARNING**

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

WARNING

High pressure steam can blow particles or chemicals into eyes, can cause severe burns, and creates hazardous noise levels. Wear protective eye, skin, and hearing protection when using high pressure steam. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.
3. Inspect cooling fan (WP 0072, Figure 1, Item 32) and blades for cracks, bends, or other damage.
4. Connect negative battery cable and close both engine access doors.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both access door and disconnect negative battery cable.
3. Remove bolts (WP 0072, Figure 1, Item 2), nuts (WP 0072, Figure 1, Item 3), and fan guards (WP 0072, Figure 1, Item 4).
4. Remove bolts (WP 0072, Figure 1, Item 13), nuts (WP 0072, Figure 1, Item 14), and shroud halves (WP 0072, Figure 1, Item 15).
5. Remove 1-1/2 in hex nut (WP 0072, Figure 1, Item 30), washer (WP 0072, Figure 1, Item 31), and fan (WP 0072, Figure 1, Item 32).

END OF TASK**INSTALLATION****CAUTION**

When installing engine cooling fan use the following procedures to ensure that the fan is not installed backward. Failure to follow these directions could result in the engine overheating and damage to the generator set.

1. Stand facing front of engine and rotate fan clockwise (CW). Leading edges of fan blades must be facing rearward. Install fan (WP 0072, Figure 1, Item 32) with washer (WP 0072, Figure 1, Item 31) and 1-1/2 in hex nut (WP 0072, Figure 1, Item 30). Torque hex nut (WP 0072, Figure 1, Item 30) to 22 ft•lbs (30 N•m).
2. Install fan shroud halves (WP 0072, Figure 1, Item 15) with bolts (WP 0072, Figure 1, Item 13) and nuts (WP 0072, Figure 1, Item 14).
3. Install fan guards (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and washers (WP 0072, Figure 1, Item 3).
4. Connect negative battery cable and close both engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF COOLANT SYSTEM, FAN BELT:
INSPECTION, REMOVAL, INSTALLATION, ADJUSTMENT**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGoggles, Gloves (Rubber) & Additional Protective
Clothing
New Lockwashers**References**

Radiator (WP 0072)

Equipment ConditionShutdown Generator Set (Allow Engine to Cool)

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.
3. Inspect fan belt (WP 0072, Figure 1, Item 33) for looseness, frays, cracks, and other damage.
4. Connect negative battery cable and close both engine access doors.

END OF TASK

REMOVAL**WARNING**

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.
3. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and right side fan guard (WP 0072, Figure 1, Item 4).
4. Remove bolts (WP 0072, Figure 1, Item 13), nuts (WP 0072, Figure 1, Item 14), and shroud halves (WP 0072, Figure 1, Item 15).
5. Loosen alternator mounting hardware (WP 0012, Figure 1, Items 1 and 4) to relieve tension from fan belt (WP 0072, Figure 1, Item 33).
6. Move alternator until fan belt (WP 0072, Figure 1, Item 33) can slip over alternator pulley.
7. Remove fan belt (WP 0072, Figure 1, Item 33) from crankshaft pulley and water pump pulley.
8. Slip fan belt (WP 0072, Figure 1, Item 33) between cooling fan (WP 0072, Figure 1, Item 32) and radiator (WP 0072, Figure 1, Item 12).

END OF TASK**INSTALLATION****WARNING**

Fan has sharp blades. Use caution and wear gloves when removing or installing belts. Failure to comply with this warning can cause injury to personnel.

1. Slip fan belt (WP 0072, Figure 1, Item 33) between cooling fan (WP 0072, Figure 1, Item 32) and radiator (WP 0072, Figure 1, Item 12).
2. Install fan belt (WP 0072, Figure 1, Item 33) onto water pump pulley, crankshaft pulley, and alternator pulley.
3. Adjust tension on fan belt (WP 0072, Figure 1, Item 33) (Adjustment), Steps 5 and 6.
4. Install right side fan guards (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and nuts (WP 0072, Figure 1, Item 3).
5. Install shroud halves (WP 0072, Figure 1, Item 15) with bolts (WP 0072, Figure 1, Item 13) and nuts (WP 0072, Figure 1, Item 14).
6. Connect negative battery cable and close access door.

END OF TASK**ADJUSTMENT****NOTE**

Run engine for 5 minutes if belt is cold. If belt is hot, let cool for 10 to 15 minutes.

1. Shutdown generator set.

ADJUSTMENT – CONTINUED

2. Open both engine access doors and disconnect negative battery cable.
3. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and right fan guard (WP 0072, Figure 1, Item 4).
4. Secure alternator and loosen alternator mounting hardware (WP 0012, Figure 1, Items 1 and 4) to relieve tension on fan belt (WP 0072, Figure 1, Item 33).
5. Adjust fan belt (WP 0072, Figure 1, Item 33) tension by moving alternator until there is 3/4 in (1.9 cm) deflection with 20 lb (89 N) force halfway between pulleys.
6. Tighten alternator mounting hardware (WP 0012, Figure 1, Items 4 and 1) while maintaining tension.
7. Install right side fan guard (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and nuts (WP 0072, Figure 1, Item 3).
8. Connect negative battery cable and close both engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL LEVEL SENDER:
INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Front Housing Panel (WP 0016)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing
Fuel Level Sender (if indications defer from testing)
New lockwashers
Sealant (WP 0150, Table 1, Item 17)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

INSPECTION

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Inspect fuel level sender (Figure 1, Item 4) for loose connections/mounting and other damage.
5. Install front housing panel (WP 0016, Installation).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

REMOVAL – CONTINUED

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

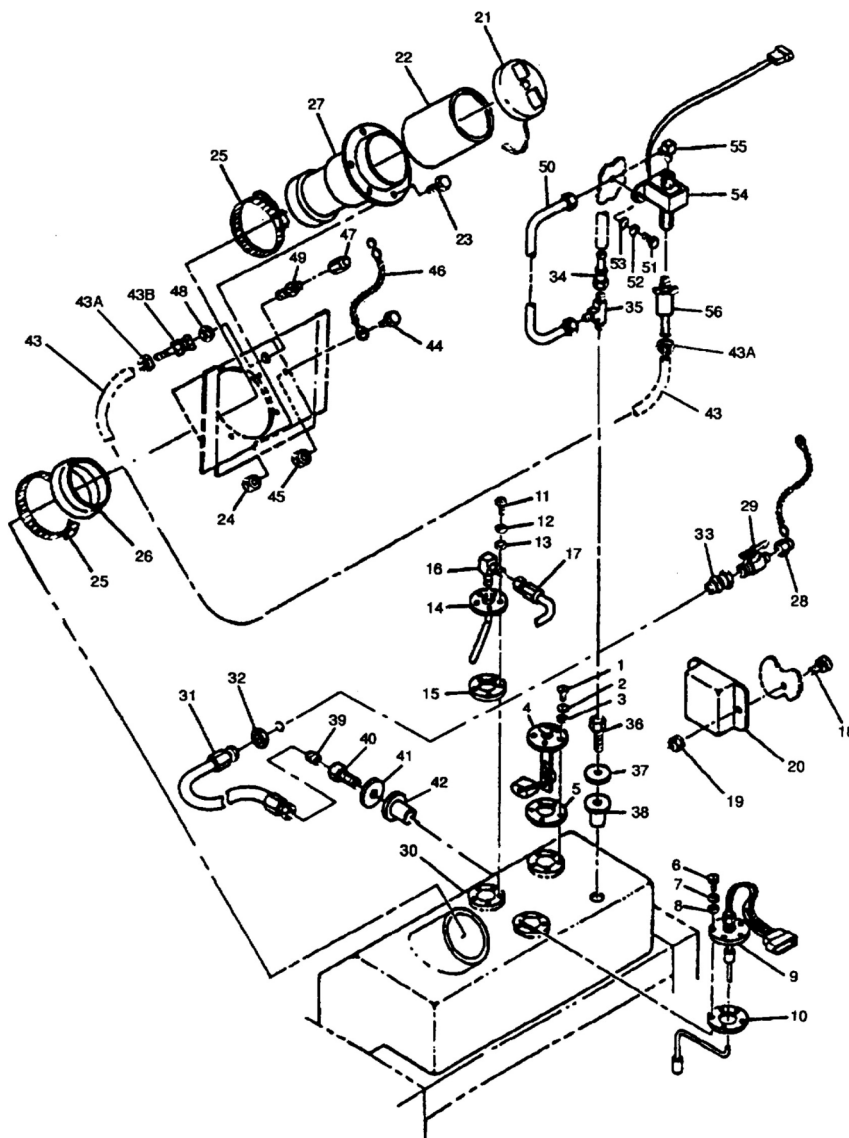


Figure 1. Fuel Tank, Switches, and Auxiliary Fuel Pump.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Tag and disconnect fuel level sender (Figure 1, Item 4) electrical leads.

REMOVAL – CONTINUED

5. Remove screws (Figure 1, Item 1), lockwashers (Figure 1, Item 2), washers (Figure 1, Item 3), fuel level sender (Figure 1, Item 4), and gasket (Figure 1, Item 5) from generator set fuel tank (Figure 1, Item 30). Note position of float when removing sender (Figure 1, Item 4). Float must be in same position when installing to ensure clearance with fuel tank (Figure 1, Item 30). Discard lockwashers (Figure 1, Item 2).
6. Cover fuel tank (Figure 1, Item 30) opening.

END OF TASK**TESTING**

1. Remove fuel level sender (Figure 1, Item 4) (Removal).
2. Position fuel level sender (Figure 1, Item 4) in vertical position, similar to position as installed in fuel tank (Figure 1, Item 30).
3. Set multimeter for ohms and connect positive lead to fuel level sender terminal and negative lead to sender ground.
4. With fuel level sender arm resting freely in what would be an empty position, multimeter should indicate between 216 and 264 ohms.
5. Move fuel level sender arm up to what would be a full position and multimeter should indicate between 29.7 and 36.3 ohms.
6. Replace fuel level sender (Figure 1, Item 4) if indications are not as above.
7. Install fuel level sender (Figure 1, Item 4) (Installation).

END OF TASK**INSTALLATION**

1. Remove cover on fuel tank (Figure 1, Item 30) opening.
2. Clean, make flat and smooth mating surfaces to gasket (Figure 1, Item 5), ensuring no foreign material enters fuel tank (Figure 1, Item 30). Apply sealant (WP 0150, Item 17) to both sides of gasket (Figure 1, Item 5).
3. Position fuel level sender (Figure 1, Item 4) and gasket (Figure 1, Item 5) to fuel tank (Figure 1, Item 30). Ensure sender (Figure 1, Item 4) is seated evenly in fuel tank (Figure 1, Item 30) and is in the same position as removed.
4. Install screws (Figure 1, Item 1), new lockwashers (Figure 1, Item 2), and washers (Figure 1, Item 3).
5. Connect electrical leads and remove tags.
6. Install front housing panel (WP 0016, Installation).
7. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**MAINTENANCE OF FUEL SYSTEM, LOW FUEL LEVEL/AUXILIARY FUEL
PUMP FLOAT SWITCH: INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Front Housing Panel (WP 0016)

Fuel Level Sender (WP 0078)

Expendable and Durable Items List (WP 0150)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing

New Lockwashers

Sealant (WP 0150, Table 1, Item 17)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

INSPECTION

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Inspect low fuel level/auxiliary fuel pump float switch (WP 0078, Figure 1, Item 9) for loose connections, loose mounting, and other damage.
5. Install front housing panel (WP 0016, Installation).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Tag and disconnect low fuel level/auxiliary fuel pump float switch (WP 0078, Figure 1, Item 9) electrical connector.
5. Remove screws (WP 0078, Figure 1, Item 6), lockwashers (WP 0078, Figure 1, Item 7), washers (WP 0078, Figure 1, Item 8), float switch (WP 0078, Figure 1, Item 9), and gasket (WP 0078, Figure 1, Item 10) from fuel tank (WP 0078, Figure 1, Item 30). Note position of float switch when removing. Float switch must be in same position when installing to ensure clearance with fuel tank (WP 0078, Figure 1, Item 30). Discard lockwashers (WP 0078, Figure 1, Item 7).
6. Cover opening in fuel tank (WP 0078, Figure 1, Item 30).

END OF TASK**TESTING**

1. Remove low fuel level/auxiliary fuel pump float switch (WP 0078, Figure 1, Item 9) (WP 0075, Removal).
2. Position float switch (WP 0078, Figure 1, Item 9) in vertical position, similar to position as installed in fuel tank (WP 0078, Figure 1, Item 30).
3. Set multimeter for ohms and connect positive lead to pin 2 and negative lead to pin 1 of float switch electrical connector.
4. With upper float moving toward the down position, multimeter should indicate continuity 1/4 in (0.63 cm) before float reaches the down position.
5. Move upper float to the full up position. Multimeter should indicate open circuit.
6. Disconnect multimeter leads from pins 1 and 2. To check lower float, connect positive lead to pin 3 and negative lead to pin 4 of float switch electrical connector.
7. Repeat Steps 4 and 5, except with lower float.
8. Replace low fuel level/auxiliary fuel pump float switch (WP 0078, Figure 1, Item 9) if indications are other than above.

TESTING – CONTINUED

9. Install low fuel level/auxiliary fuel pump float switch (WP 0078, Figure 1, Item 9) (Installation).

END OF TASK**INSTALLATION**

1. Loosen float switch plate adjusting nut.
2. Remove cover in fuel tank (WP 0078, Figure 1, Item 30) opening.
3. Clean, make flat and smooth mating surfaces to gasket (WP 0078, Figure 1, Item 10), ensuring no foreign material enters fuel tank (WP 0078, Figure 1, Item 30). Apply sealant (WP 0150, Item 17) to both sides of gasket (WP 0078, Figure 1, Item 10).
4. Position gasket (WP 0078, Figure 1, Item 10) and float switch (WP 0078, Figure 1, Item 9) in fuel tank (WP 0078, Figure 1, Item 30). Ensure float switch (WP 0078, Figure 1, Item 9) is in same position as removed.
5. Install screws (WP 0078, Figure 1, Item 6), new lock washers (WP 0078, Figure 1, Item 7), and washers (WP 0078, Figure 1, Item 8).
6. Set float switch stem 1/16 in from bottom of fuel tank (WP 0078, Figure 1, Item 30) and tighten float switch plate adjusting nut.
7. Connect electrical connector and remove tag.
8. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL PICKUP: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing
New Lockwashers
Sealant (WP 0150, Table 1, Item 17)

References

Front Housing Panel (WP 0016)
Fuel Level Sender (WP 0078)
Expendable and Durable Items List (WP 0150)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

Personnel Required

91D (1)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

REMOVAL – CONTINUED**WARNING**

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Disconnect fuel line (WP 0078, Figure 1, Item 17) from fitting (WP 0078, Figure 1, Item 16), and cap line.

NOTE

Mark position of fuel pickup (WP 0078, Figure 1, Item 14) before removing.

5. Remove screws (WP 0078, Figure 1, Item 11), lockwashers (WP 0078, Figure 1, Item 12), washers (WP 0078, Figure 1, Item 13), fuel pickup (WP 0078, Figure 1, Item 14), and gasket (WP 0078, Figure 1, Item 15) from fuel tank (WP 0078, Figure 1, Item 30). Discard lockwashers (WP 0078, Figure 1, Item 12).
6. Remove fitting (WP 0078, Figure 1, Item 16) from fuel pickup (WP 0078, Figure 1, Item 14).

END OF TASK**INSPECTION**

1. Remove fuel pickup (WP 0078, Figure 1, Item 14) (Removal).
2. Inspect fuel pickup (WP 0078, Figure 1, Item 14) and fitting (WP 0078, Figure 1, Item 16) for clogs, stripped threads, and other damage.
3. Replace damaged parts.
4. Install fuel pickup (WP 0078, Figure 1, Item 14) (Installation).

END OF TASK**INSTALLATION****NOTE**

Ensure fuel pickup (WP 0078, Figure 1, Item 14) is in same position as marked on removal.

1. Remove cover on fuel tank (WP 0078, Figure 1, Item 30) opening.
2. Clean, make flat and smooth mating surfaces to gasket (WP 0078, Figure 1, Item 15), ensuring no foreign material enters fuel tank (WP 0078, Figure 1, Item 30). Apply sealant (WP 0150, Item 17) to both sides of gasket (WP 0078, Figure 1, Item 15).
3. Install gasket (WP 0078, Figure 1, Item 15) and fuel pickup (WP 0078, Figure 1, Item 14) in fuel tank with screws (WP 0078, Figure 1, Item 11), new lockwashers (WP 0078, Figure 1, Item 12), and washers (WP 0078, Figure 1, Item 13).
4. Install fitting (WP 0078, Figure 1, Item 16) in fuel pickup (WP 0078, Figure 1, Item 14).
5. Connect fuel line (WP 0078, Figure 1, Item 17) to fitting (WP 0078, Figure 1, Item 16).
6. Install front housing panel (WP 0016, Installation).

INSTALLATION – CONTINUED

7. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
MAINTENANCE OF FUEL SYSTEM, FUEL FLOAT MODULE: TESTING, REMOVAL, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Front Housing Panel (WP 0016)

Fuel Level Sender (WP 0078)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

Personnel Required

91D (1)

TESTING

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Disconnect and tag fuel float module (WP 0078, Figure 1, Item 20) electrical connector (J12) from fuel float switch (WP 0078, Figure 1, Item 9) connector (P12).
5. Connect pins 1 and 2 of fuel float module (WP 0078, Figure 1, Item 20) electrical connector (J12) together with a jumper wire.
6. Connect negative battery cable; move MASTER SWITCH to PRIME & RUN AUX FUEL position; and auxiliary fuel pump (WP 0078, Figure 1, Item 54) should start operating. Remove jumper wire and auxiliary fuel pump (WP 0078, Figure 1, Item 54) should stop operating.
7. Start and operate generator set at rated voltage and frequency.
8. Using jumper wire, make connection between pins 3 and 4 of fuel float module (WP 0078, Figure 1, Item 20) electrical connector (J12). Generator set should shut down after approximately 2 seconds and NO FUEL lamp on malfunction indicator panel should light.
9. Replace fuel float module (WP 0078, Figure 1, Item 20) if operation is other than above.
10. j.. Install front housing panel (WP 0016, Installation).
11. Close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Tag and disconnect electrical connector from fuel float module (WP 0078, Figure 1, Item 20).
5. Remove bolts (WP 0078, Figure 1, Item 18), nuts (WP 0078, Figure 1, Item 19), and fuel float module (WP 0078, Figure 1, Item 20) from generator set.

END OF TASK**INSTALLATION**

1. Install fuel float module (WP 0078, Figure 1, Item 20) in generator set with bolts (WP 0078, Figure 1, Item 18) and nuts (WP 0078, Figure 1, Item 19).
2. Connect fuel float module (WP 0078, Figure 1, Item 20) electrical connector and remove tag.
3. Install front housing panel (WP 0016, Installation).
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
MAINTENANCE OF FUEL SYSTEM, LOW PRESSURE
FUEL LINES: INSPECTION, REMOVAL, INSTALLATION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing

Personnel Required

91D (1)

References

Front Housing Panel (WP 0016)

Fuel Level Sender (WP 0078)

Fuel Transfer Pump (WP 0087)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

INSPECTION

1. Shutdown generator set.
2. Remove front housing panel (WP 0016, Removal).
3. Inspect fuel lines for deterioration, cracks, and leaks.
4. Install front housing panel (WP 0016, Installation).

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Identify fuel line or fitting that is damaged or leaking and must be removed (as shown in WP 0078, Figure 1 or WP 0087, Figure 1).
4. Disconnect fuel line at both ends and remove any clamps. Cap openings.
5. Remove fuel line or fitting from generator set.
6. Cover or cap all openings.

END OF TASK**INSTALLATION**

1. Remove any caps and position fuel line or fitting in generator set.
2. Install any clamps as removed and connect fuel line at both ends.
3. Connect negative battery cable.
4. Turn MASTER SWITCH to PRIME & RUN or PRIME & RUN AUXILIARY FUEL position as applicable, and check for fuel leaks.
5. Close all access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL TANK FILLER NECK: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing

Personnel Required

91D (1)

References

Front Housing Panel (WP 0016)

Fuel Level Sender (WP 0078)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

REMOVAL – CONTINUED**WARNING**

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Remove filler cap (WP 0078, Figure 1, Item 21). Rotate tube (WP 0078, Figure 1, Item 22) one quarter turn counterclockwise (CCW), and remove from filler neck (WP 0078, Figure 1, Item 27).
5. Remove bolts (WP 0078, Figure 1, Item 23) and nuts (WP 0078, Figure 1, Item 24).
6. Remove clamps (WP 0078, Figure 1, Item 25), rubber collar (WP 0078, Figure 1, Item 26), and filler neck (WP 0078, Figure 1, Item 27) from fuel tank (WP 0078, Figure 1, Item 30) opening.
7. Cover fuel tank (WP 0078, Figure 1, Item 30) opening.

END OF TASK**INSPECTION**

1. Shutdown generator set.
2. Remove front housing panel (WP 0016, Removal).
3. Inspect rubber collar (WP 0078, Figure 1, Item 26) for cracks, wear, and other damage.
4. Inspect filler neck (WP 0078, Figure 1, Item 27), clamps (WP 0078, Figure 1, Item 25), tube (WP 0078, Figure 1, Item 22), and cap (WP 0078, Figure 1, Item 21) for corrosion, cracking, and other damage.
5. Install front housing panel (WP 0016, Installation).

END OF TASK**INSTALLATION**

1. Position filler neck (WP 0078, Figure 1, Item 27), on fuel tank (WP 0078, Figure 1, Item 30) opening.
2. Install rubber collar (WP 0078, Figure 1, Item 26) and clamps (WP 0078, Figure 1, Item 25) onto filler neck (WP 0078, Figure 1, Item 27) and fuel tank (WP 0078, Figure 1, Item 30) opening.
3. Install bolts (WP 0078, Figure 1, Item 23) and nuts (WP 0078, Figure 1, Item 24).
4. Install filler cap (WP 0078, Figure 1, Item 21) and tube (WP 0078, Figure 1, Item 22).
5. Install front housing panel (WP 0016, Installation).
6. Connect negative battery cable and close access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL DRAIN VALVE: REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing

Personnel Required

91D (1)

References

Service Upon Receipt (WP 0006)

Fuel Level Sender (WP 0078)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

REMOVAL – CONTINUED**WARNING**

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine left side engine access door and disconnect negative battery cable.
3. Remove cap (WP 0078, Figure 1, Item 28), open fuel drain valve (WP 0078, Figure 1, Item 29) and drain fuel into suitable container.
4. Remove fuel drain valve (WP 0078, Figure 1, Item 29) from fitting (WP 0078, Figure 1, Item 33) at left side skid.
5. Remove fuel drain line (WP 0078, Figure 1, Item 31) from adapter (WP 0078, Figure 1, Item 39) and fitting (WP 0078, Figure 1, Item 33).
6. Remove nut (WP 0078, Figure 1, Item 32) and fitting (WP 0078, Figure 1, Item 33) from left side skid.

END OF TASK**INSTALLATION**

1. Install fitting (WP 0078, Figure 1, Item 33) in left side skid with nut (WP 0078, Figure 1, Item 32).
2. Install fuel drain line (WP 0078, Figure 1, Item 31) to fitting (WP 0078, Figure 1, Item 33) and adapter (WP 0078, Figure 1, Item 39).
3. Install fuel drain valve (WP 0078, Figure 1, Item 29) in fitting (WP 0078, Figure 1, Item 33) at left side skid.
4. Install cap (WP 0078, Figure 1, Item 28) on fuel drain valve (WP 0078, Figure 1, Item 29). Ensure fuel drain valve (WP 0078, Figure 1, Item 29) is closed.
5. Fill fuel tank (WP 0078, Figure 1, Item 30) with fuel. See WP 0006, Table 2 for recommended fuel. Check for fuel leaks.
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL TANK: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing

Personnel Required

91D (1)

References

Service Upon Receipt (WP 0006)
Front Housing Panel (WP 0016)
Front Housing Section (WP 0017)
Fuel Level Sender (WP 0078)
Low Fuel Level/Auxiliary Fuel Pump Float Switch (WP 0079)
Fuel Drain Valve (WP 0084)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

REMOVAL – CONTINUED**WARNING**

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine left side engine access door and disconnect negative battery cable.
3. Drain fuel into a suitable container.
4. Remove front housing section (WP 0017, Removal).
5. Remove fuel drain valve (WP 0078, Figure 1, Item 29) (WP 0084, Removal).
6. Remove fuel tank (WP 0078, Figure 1, Item 30) from generator set.
7. Remove fittings (WP 0078, Figure 1, Items 34 and 35) from fuel tank fitting (WP 0078, Figure 1, Item 36).
8. Remove adapter (WP 0078, Figure 1, Item 39) from fuel tank fitting (WP 0078, Figure 1, Item 40).
9. Remove fittings (WP 0078, Figure 1, Items 36 and 40), washers (WP 0078, Figure 1, Items 37 and 41), and bushings (WP 0078, Figure 1, Items 38 and 42) from fuel tank (WP 0078, Figure 1, Item 30).
10. Remove fuel float switch (WP 0079, Removal), fuel level sender (WP 0078, Removal), and fuel pickup (WP 0076, Removal) from fuel tank (WP 0078, Figure 1, Item 30).

END OF TASK**INSPECTION**

1. Shutdown generator set.
2. Remove fuel tank (WP 0078, Figure 1, Item 30) (Removal).
3. Inspect fuel tank (WP 0078, Figure 1, Item 30) for leaks and cracks.
4. Install fuel tank (WP 0078, Figure 1, Item 30) (Installation).

END OF TASK**INSTALLATION**

1. Install fuel level sender (WP 0078, Installation), fuel float switch (WP 0079, Installation), and fuel pickup (WP 0076, Installation) in fuel tank (WP 0078, Figure 1, Item 30).
2. Install bushings (WP 0078, Figure 1, Items 38 and 42), washers (WP 0078, Figure 1, Items 37 and 41), and fittings (WP 0078, Figure 1, Items 36 and 40) in fuel tank (WP 0078, Figure 1, Item 30).
3. Install adapter (WP 0078, Figure 1, Item 39) in fuel tank fitting (WP 0078, Figure 1, Item 40).
4. Install fittings (WP 0078, Figure 1, Items 35 and 34) in fuel tank fitting (WP 0078, Figure 1, Item 36).
5. Install fuel tank (WP 0078, Figure 1, Item 30) in generator set.
6. Install fuel drain valve (WP 0078, Figure 1, Item 29) (WP 0084, Installation).
7. Install front housing section (except front housing panel) (WP 0017, Installation).
8. Service fuel tank (WP 0078, Figure 1, Item 30) with fuel. Refer to WP 0006, Table 2 for recommended fuel.

INSTALLATION – CONTINUED

9. Connect negative battery cable.
10. Start generator set and check for leaks and proper operation.
11. Shutdown generator set and install front housing panel (WP 0016, Installation).
12. Close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, AUXILIARY FUEL
PUMP: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing
New Lockwashers

References

Front Housing Panel (WP 0016)
Fuel Level Sender (WP 0078)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

Personnel Required

91D (1)

INSPECTION

1. Shutdown generator set.
2. Remove front housing panel (WP 0016, Removal).
3. Check auxiliary fuel pump (WP 0078, Figure 1, Item 54) for leaks, cracks, missing hardware, loose connections, and other damage.
4. Install front housing panel (WP 0016, Installation).

END OF TASK**TESTING**

1. Open left side engine access door and disconnect negative battery cable.
2. Remove front housing panel (WP 0016, Removal).
3. Connect generator set to auxiliary fuel supply at fitting (WP 0078, Figure 1, Item 49).

NOTE

Ensure auxiliary fuel supply is level with or above auxiliary fuel pump (WP 0078, Figure 1, Item 54) inlet.

4. Disconnect auxiliary fuel pump outlet tube (WP 0078, Figure 1, Item 50) at fuel tank fitting (WP 0078, Figure 1, Item 35) and place disconnected end in measuring container.
5. Connect negative battery cable.
6. Move generator set MASTER SWITCH to PRIME & RUN AUX FUEL position for 1 minute and return MASTER SWITCH to OFF position.
7. Measuring container should have collected at least 32 oz (0.95 L) of fuel.
8. Replace auxiliary fuel pump (WP 0078, Figure 1, Item 54) if delivery amount is other than above.

TESTING – CONTINUED

9. Connect auxiliary fuel pump outlet tube (WP 0078, Figure 1, Item 50) at fuel tank fitting (WP 0078, Figure 1, Item 35).
10. Disconnect generator set from auxiliary fuel supply.
11. Install front housing panel (WP 0016, Installation).
12. Close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove front housing panel (WP 0016, Removal).
4. Tag and disconnect auxiliary fuel pump (WP 0078, Figure 1, Item 54) electrical connector.

REMOVAL – CONTINUED

5. Loosen clamps (WP 0078, Figure 1, Item 43A). Disconnect filter (WP 0078, Figure 1, Item 56) and remove adapter fitting (WP 0078, Figure 1, Item 43B) from filler neck panel fitting (WP 0078, Figure 1, Item 49). Remove adapter fitting (WP 0078, Figure 1, Item 43B) from fuel inlet hose (WP 0078, Figure 1, Item 43). Remove filter (WP 0078, Figure 1, Item 56) from auxiliary fuel pump (WP 0078, Figure 1, Item 54). Cap fuel inlet hose (WP 0078, Figure 1, Item 43).
6. Remove bolt (WP 0078, Figure 1, Item 44), nut (WP 0078, Figure 1, Item 45), chain (WP 0078, Figure 1, Item 46), cap (WP 0078, Figure 1, Item 47), nut (WP 0078, Figure 1, Item 48), and fitting (WP 0078, Figure 1, Item 49) from fuel filler panel.
7. Remove auxiliary fuel outlet tube (WP 0078, Figure 1, Item 50) from auxiliary fuel pump (WP 0078, Figure 1, Item 54), and fitting (WP 0078, Figure 1, Item 35). Cap fuel outlet tube (WP 0078, Figure 1, Item 50) openings.
8. Remove bolts (WP 0078, Figure 1, Item 51), lockwashers (WP 0078, Figure 1, Item 52), washers (WP 0078, Figure 1, Item 53), and auxiliary fuel pump (WP 0078, Figure 1, Item 54) from generator set. Discard lockwashers (WP 0078, Figure 1, Item 52).

NOTE

Auxiliary fuel pump (WP 0078, Figure 1, Item 54) may be supplied with integral fitting (WP 0078, Figure 1, Item 55).

9. Remove fitting (WP 0078, Figure 1, Item 55) from auxiliary fuel pump (WP 0078, Figure 1, Item 54).

END OF TASK**INSTALLATION**

1. Install auxiliary fuel pump (WP 0078, Figure 1, Item 54) with bolts (WP 0078, Figure 1, Item 51), new lockwashers (WP 0078, Figure 1, Item 52), and washers (WP 0078, Figure 1, Item 53).
2. Install fitting (WP 0078, Figure 1, Item 49), nut (WP 0078, Figure 1, Item 48), cap (WP 0078, Figure 1, Item 47), chain (WP 0078, Figure 1, Item 46), bolt (WP 0078, Figure 1, Item 44), and nut (WP 0078, Figure 1, Item 45) to fuel filler panel.
3. Remove caps and install fitting (WP 0078, Figure 1, Item 55) and auxiliary fuel outlet tube (WP 0078, Figure 1, Item 50) to auxiliary fuel pump (WP 0078, Figure 1, Item 54) and fitting (WP 0078, Figure 1, Item 35).
4. Remove caps from fuel inlet hose (WP 0078, Figure 1, Item 43). Install filter (WP 0078, Figure 1, Item 56) on auxiliary fuel pump (WP 0078, Figure 1, Item 54). Install adapter fitting (43B) on fuel inlet hose (WP 0078, Figure 1, Item 43) and connect adapter fitting (43B) to filler neck panel fitting (WP 0078, Figure 1, Item 49). Connect other end of fuel inlet hose to filter (WP 0078, Figure 1, Item 56). Tighten clamps (43A).
5. Connect auxiliary fuel pump electrical connector and remove tag.
6. Install front housing panel (WP 0016, Installation).
7. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL TRANSFER
PUMP: INSPECTION, TESTING, REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGoggles, Gloves & Additional Protective Clothing
New Lockwashers**References**

Radiator (WP 0072)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

INSPECTION**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

INSPECTION – CONTINUED**WARNING**

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Inspect fuel transfer pump (Figure 1, Item 6) for leaks, cracks, missing hardware, and loose connections.
4. Connect negative battery cable and close left side engine access door.

END OF TASK**TESTING**

1. Shutdown generator set.
2. Open left side engine access door and disconnect fuel transfer pump outlet line (Figure 1, Item 9) at secondary fuel filter. Place end of disconnected line in measuring container.
3. Move generator set MASTER SWITCH to PRIME & RUN position for 1 minute and return MASTER SWITCH to OFF position.

TESTING – CONTINUED

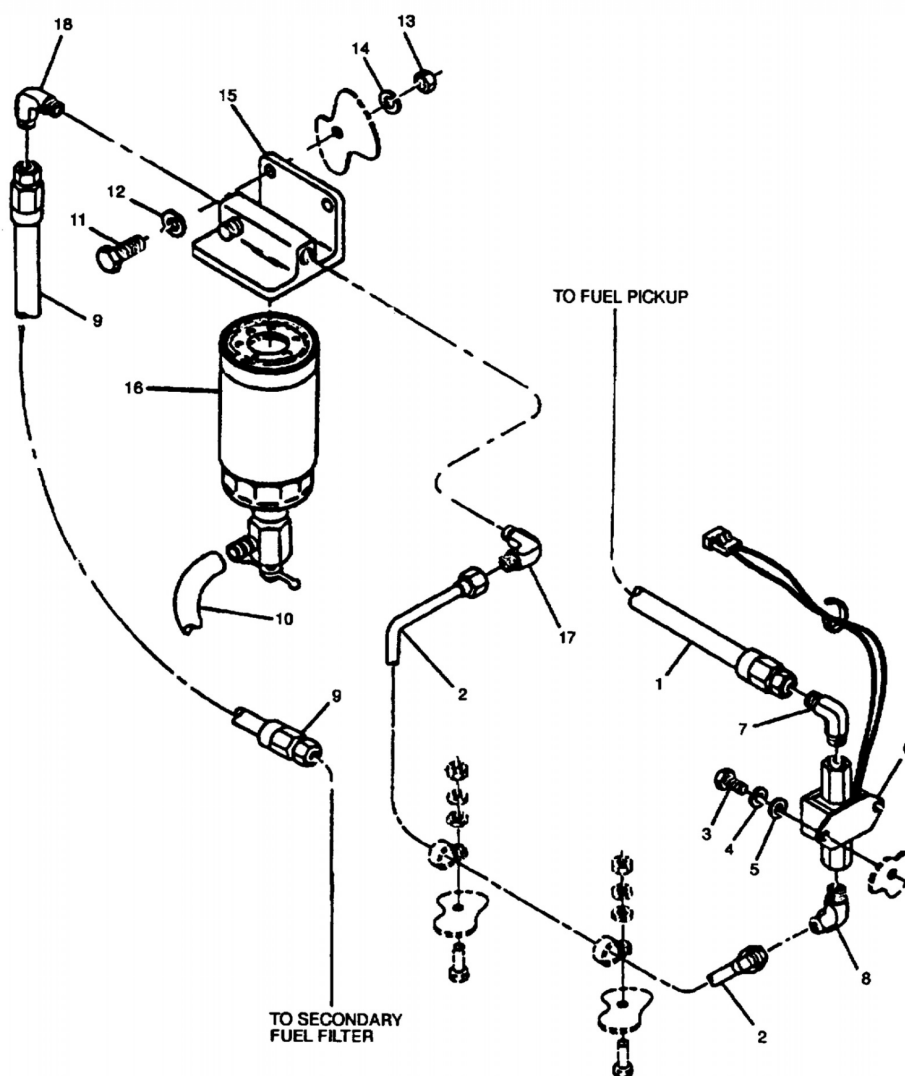


Figure 1. Fuel Filter/Water Separator and Transfer Pump.

4. Measuring container should have collected at least 25 oz (0.74 L) of fuel.
5. Replace fuel transfer pump if delivery amount is other than above.
6. Connect fuel line (Figure 1, Item 9) to secondary fuel filter.
7. Close left side engine access door.

END OF TASK

REMOVAL

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.

REMOVAL – CONTINUED

3. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and left side fan guard (WP 0072, Figure 1, Item 4).
4. Tag and disconnect fuel transfer pump (Figure 1, Item 6) electrical connector.
5. Disconnect inlet fuel hose (Figure 1, Item 1) from fuel transfer pump (Figure 1, Item 6). Cap hose.
6. Disconnect outlet fuel tube (Figure 1, Item 2) from fuel transfer pump (Figure 1, Item 6). Cap tube.
7. Remove bolts (Figure 1, Item 3), lockwashers (Figure 1, Item 4), washers (Figure 1, Item 5), and fuel transfer pump (Figure 1, Item 6) from generator set. Discard lockwashers (Figure 1, Item 4).

NOTE

Fuel transfer pump (Figure 1, Item 6) may be supplied with integral fitting (Figure 1, Item 7).

8. Remove fitting (Figure 1, Item 7), when applicable, and fitting (Figure 1, Item 8) from fuel transfer pump (Figure 1, Item 6).

END OF TASK**INSTALLATION**

1. Install fitting (Figure 1, Item 7), when applicable, and fitting (Figure 1, Item 8) in fuel transfer pump (Figure 1, Item 6).
2. Install fuel transfer pump (Figure 1, Item 6) with bolts (Figure 1, Item 3), new lockwashers (Figure 1, Item 4), and washers (Figure 1, Item 5).
3. Remove caps and connect fuel hose (Figure 1, Item 1) and fuel tube (Figure 1, Item 2) at fuel transfer pump (Figure 1, Item 6).
4. Connect electrical connector and remove tag.
5. Install left side fan guard (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and washers (WP 0072, Figure 1, Item 3).
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF FUEL SYSTEM, FUEL FILTER/WATER
SEPARATOR: INSPECTION, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing
New Lockwashers

Personnel Required

91D (1)

References

Control Box Assembly (WP 0019)
Fuel Transfer Pump (WP 0087)
Fuel Filter/Water Separator Element (WP 0089)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

INSPECTION

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Inspect fuel filter/water separator assembly (WP 0087, Figure 1, Item 16) for fuel leaks and loose connections.
4. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box assembly (WP 0019, Removal).
4. Loosen output box mounting hardware to allow access to fuel filter/water separator fuel lines.
5. Disconnect fuel outlet line (WP 0087, Figure 1, Item 9), inlet line (WP 0087, Figure 1, Item 2), and water drain line (WP 0087, Figure 1, Item 10) from fuel filter/water separator assembly (WP 0087, Figure 1, Item 16). Cap all lines.
6. Remove bolts (WP 0087, Figure 1, Item 11), washers (WP 0087, Figure 1, Item 12), nuts (WP 0087, Figure 1, Item 13), lockwashers (WP 0087, Figure 1, Item 14), and fuel filter/water separator assembly (WP 0087, Figure 1, Item 16) from generator set. Discard lockwashers (WP 0087, Figure 1, Item 14).
7. Remove fuel filter/water separator element (WP 0089, Removal).
8. Remove fittings (WP 0087, Figure 1, Items 17 and 18) from base (WP 0087, Figure 1, Item 15).

END OF TASK**REPAIR**

Repair assembly by replacing fuel filter/water separator element (WP 0089).

END OF TASK**INSTALLATION**

1. Install fittings (17 and 18, Figure 2-23) in base (WP 0087, Figure 1, Item 15).
2. Install fuel filter/water separator element (WP 0089, Installation).
3. Install fuel filter/water assembly (WP 0087, Figure 1, Item 16) in generator set with bolts (WP 0087, Figure 1, Item 11), washers (WP 0087, Figure 1, Item 12), new lockwashers (WP 0087, Figure 1, Item 14), and nuts (WP 0087, Figure 1, Item 13).

INSTALLATION – CONTINUED

4. Remove caps and connect water drain line (WP 0087, Figure 1, Item 10), fuel outlet line (WP 0087, Figure 1, Item 9), and fuel inlet line (WP 0087, Figure 1, Item 2) to fuel filter/water separator assembly (WP 0087, Figure 1, Item 16).
5. Tighten output box mounting hardware.
6. Install control box assembly (WP 0019, Installation).
7. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

MAINTENANCE OF FUEL SYSTEM, FUEL FILTER/WATER SEPARATOR ELEMENT: REMOVAL, INSPECTION, INSTALLATION

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Fuel Transfer Pump (WP 0087)
Expendable and Durable Items List (WP 0150)

Materials/Parts

Goggles, Gloves & Additional Protective Clothing
Engine oil (WP 0150, Table 1, Item 13)

Equipment Condition

Shutdown Generator Set (Allow Engine to Cool)

Personnel Required

91D (1)

REMOVAL

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

REMOVAL – CONTINUED**WARNING**

Fuels used in the generator set are flammable. When filling the fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Disconnect water drain line (WP 0087, Figure 1, Item 10) from fuel filter/water separator assembly (WP 0087, Figure 1, Item 16).
4. Unscrew and remove fuel filter/water separator assembly (WP 0087, Figure 1, Item 16) from base (WP 0087, Figure 1, Item 15). Remove element.

END OF TASK**INSPECTION**

1. Remove fuel filter/water separator element (Removal).
2. Inspect element for clogging, tears, and other damage.
3. Install fuel filter/water separator element (Installation).

END OF TASK**INSTALLATION**

1. Install element. Open petcock valve on fuel filter/water separator assembly (WP 0087, Figure 1, Item 16).
2. Apply a film of engine oil (WP 0150, Item 13) to the sealing surface of fuel filter/water separator assembly (WP 0087, Figure 1, Item 16).
3. Install fuel filter/water separator assembly (WP 0087, Figure 1, Item 16) on base (WP 0087, Figure 1, Item 15). Hand-tighten only.
4. Connect water drain line (WP 0087, Figure 1, Item 10) to fuel filter/ water separator assembly (WP 0087, Figure 1, Item 16).
5. Close petcock valve on fuel filter/water separator assembly (WP 0087, Figure 1, Item 16). Hand-tighten only.
6. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF LUBRICATION SYSTEM, OIL DRAIN
LINE: INSPECTION, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Heat Resistant Gloves & Protective Clothing
Eye Protection
Suitable Container for Oil Drainage
New lockwashers

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

INSPECTION**WARNING**

The high pressure oil system operates at high temperature and pressure. Contact with hot oil can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Wear heat resistant gloves and avoid contacting hot surfaces. Do not allow hot oil or components to contact skin or hands. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Oil filter base and housing springs are under tension and can act as projectiles when being removed. Use eye protection when removing springs. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Inspect oil drain line for leaks, loose fittings, and other damage.
4. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove plug (Figure 1, Item 1), open drain valve (Figure 1, Item 2), and drain engine oil into suitable container.
4. Remove clamps (Figure 1, Item 3) and drain hose (Figure 1, Item 4).
5. Remove drain valve (Figure 1, Item 2), fitting (Figure 1, Item 5), and pipe (Figure 1, Item 6) from plate (Figure 1, Item 13).
6. Remove fitting (Figure 1, Item 5) and pipe (Figure 1, Item 6) from drain valve (Figure 1, Item 2).
7. Remove elbow (Figure 1, Item 7) and fitting (Figure 1, Item 8) from engine.
8. Remove fitting (Figure 1, Item 8) from elbow (Figure 1, Item 7).
9. Remove bolts (Figure 1, Item 9), washers (Figure 1, Item 10), lockwashers (Figure 1, Item 11), nuts (Figure 1, Item 12), and plate (Figure 1, Item 13) from left side engine door sill. Discard lockwashers (Figure 1, Item 11).

END OF TASK**REPAIR**

Repair oil drain line by replacing clamps, hoses, and fittings.

END OF TASK**INSTALLATION**

1. Install plate (Figure 1, Item 13) in left side engine door sill with bolts (Figure 1, Item 9), washers (Figure 1, Item 10), new lockwashers (Figure 1, Item 11), and nuts (Figure 1, Item 12).
2. Install fitting (Figure 1, Item 8) in elbow (Figure 1, Item 7).
3. Install elbow (Figure 1, Item 7) and fitting (Figure 1, Item 8) into engine.
4. Install pipe (Figure 1, Item 6) and fitting (Figure 1, Item 5) in drain valve (Figure 1, Item 2).
5. Install drain valve (Figure 1, Item 2), fitting (Figure 1, Item 5), and pipe (Figure 1, Item 6) into plate (Figure 1, Item 13).
6. Install drain hose (Figure 1, Item 4) with clamps (Figure 1, Item 3).
7. Close drain valve (Figure 1, Item 2), install plug (Figure 1, Item 1), and add engine oil to proper level. See Table 2-3 for proper lubrication oil.
8. Check oil drain line and valve (Figure 1, Item 2) for leakage.
9. Connect negative battery cable and close left side engine access door.

INSTALLATION – CONTINUED

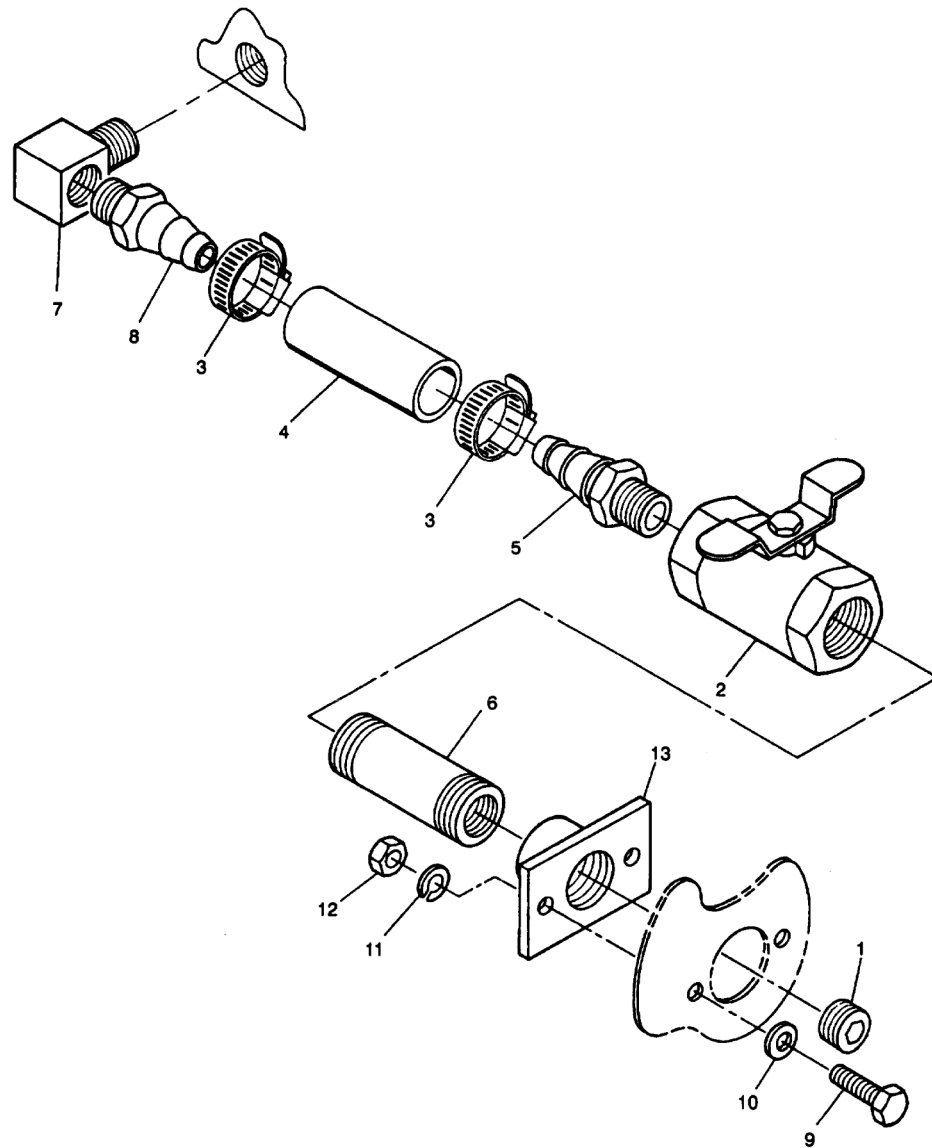


Figure 1. Oil Drain Line.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, FREQUENCY ADJUST
CONTROL CABLE: REMOVAL, INSPECTION, INSTALLATION, ADJUSTMENT**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Radiator (WP 0072)

Low Fuel Level/Auxiliary Fuel Pump Float Switch
Pump (WP 0079)**Personnel Required**

91D (1)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

When running, generator set engine has hot metal surfaces that will burn flesh on contact. Shutdown generator set and allow engine to cool before performing checks, services, and maintenance. Wear gloves and additional protective clothing as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

REMOVAL

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove bolts (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and left fan guard (WP 0072, Figure 1, Item 4).
4. Spread keeper (Figure 1, Item 1) and remove control cable wedge (Figure 1, Item 2) at governor speed lever (Figure 1, Item 3).

REMOVAL – CONTINUED

5. Open load terminal board access door and loosen nut (Figure 1, Item 4). Slide nut (Figure 1, Item 4) and washer (Figure 1, Item 5) off cable (Figure 1, Item 6).
6. Remove frequency adjust control cable assembly from rear of generator set.

END OF TASK**INSPECTION**

1. Shutdown generator set.

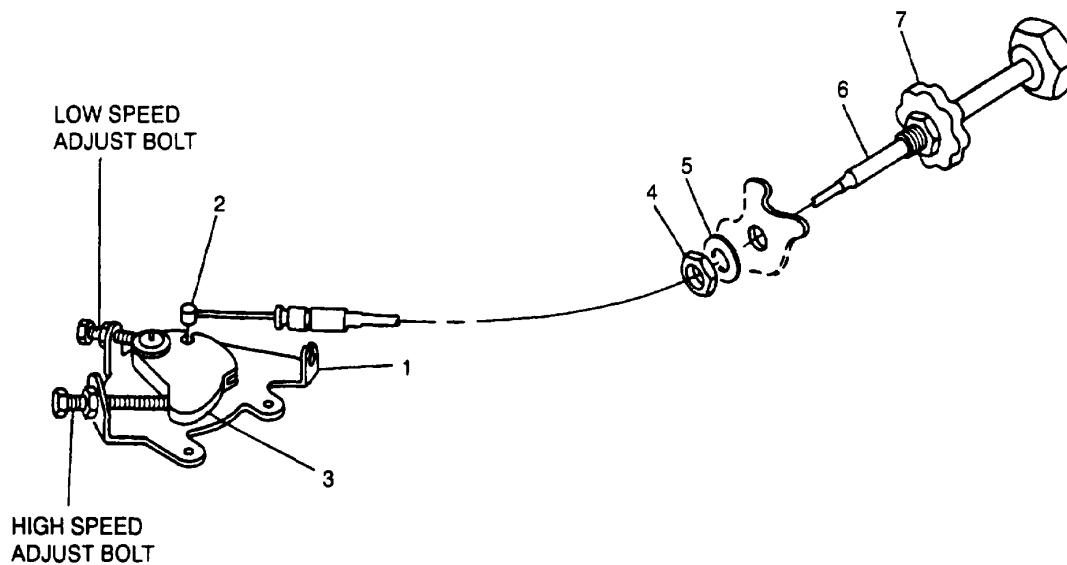


Figure 1. Frequency Adjust Control Cable Assembly.

2. Inspect frequency adjust control cable assembly for broken or frayed cable, stripped threads, corrosion, and damaged knobs.
3. Replace damaged parts or cable assembly, as necessary.

END OF TASK**INSTALLATION**

1. Insert frequency adjust control cable assembly at rear of generator set.
2. Install washer (Figure 1, Item 5) and nut (Figure 1, Item 4), and close load terminal board access door.
3. Install control cable wedge (Figure 1, Item 2) at governor speed lever (Figure 1, Item 3).
4. Install frequency control cable (Figure 1, Item 6) in keeper (Figure 1, Item 1). Close keeper (Figure 1, Item 1).
5. Connect negative battery cable.
6. Start generator set. Using frequency adjust control, ensure the following adjustment range:
MEP-802A = 58-65 Hz.

INSTALLATION – CONTINUED

MEP-812A = 388-420 Hz.

If frequency adjustment range is not correct, adjust frequency, WP 0079, Adjustment.

7. If adjustment is correct, Shutdown generator set.
8. Install left fan guard (WP 0072, Figure 1, Item 4) with bolts (WP 0072, Figure 1, Item 2) and washers (WP 0072, Figure 1, Item 3).
9. Close left side engine access door.

END OF TASK**ADJUSTMENT**

1. Shutdown generator set.
2. Open left side engine access door and remove control cable wedge (Figure 1, Item 2) from governor speed lever (Figure 1, Item 3).
3. Loosen jamnuts on both speed adjust bolts on governor control and turn bolts counterclockwise (CCW) until they do not touch speed lever (Figure 1, Item 3).
4. Adjust frequency control adjust cable (Figure 1, Item 6) with nuts (Figure 1, Item 4) and connect cable (Figure 1, Item 6) to speed lever (Figure 1, Item 3) so that speed lever (Figure 1, Item 3) is positioned approximately mid-range.
5. Start generator set. Using frequency adjust control, adjust frequency to 65 Hz (420 Hz for MEP-812A).
6. Turn high speed adjust bolt on governor control until it contacts speed lever (Figure 1, Item 3), and tighten jamnut.
7. Using frequency adjust control, adjust frequency to 58 Hz (388 Hz for MEP-812A)
8. Turn low speed adjust bolt on governor control until it contacts speed lever (Figure 1, Item 3) and tighten jamnut.
9. Using frequency adjust control, cycle generator set frequency from minimum to maximum and back to minimum to verify settings.
10. Readjust high or low speed adjust bolts on governor control as needed to obtain required frequency adjustment range.
11. Shutdown generator set and close left side engine access door

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, LOW OIL PRESSURE SWITCH:
TESTING, REMOVAL, CLEANING AND INSPECTION, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

TM-9-2815-252-24

Expendable and Durable Items List (WP 0150)

Materials/Parts

Eye Protection

Cleaning Cloth (WP 0150, Table 1, Item 7)

Dry Cleaning Solvent (WP 0150, Table 1, Item 20)

Equipment ConditionShutdown Generator Set

TESTING**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

TESTING – CONTINUED**NOTE**

Prior to performing this test, refer to TM 9-2815-252-24 and verify engine has good oil pressure.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Tag and disconnect electrical leads from low oil pressure switch (Figure 1, Item 1).
4. Set multimeter for ohms and connect across oil pressure switch (Figure 1, Item 1) connector pins C and NO. Multimeter shall indicate open circuit.
5. Connect multimeter across oil pressure switch (Figure 1, Item 1) connector pins C and NC. Multimeter shall indicate continuity.
6. Connect negative battery cable.
7. Start generator set. Place BATTLE SHORT switch in ON position before releasing MASTER SWITCH from START position.
8. Connect multimeter to oil pressure switch (Figure 1, Item 1) connector pins C and NC. Multimeter shall indicate open circuit.
9. Connect multimeter across oil pressure switch (Figure 1, Item 1) connector pins C and NO. Multimeter shall indicate continuity.
10. Shutdown generator set. Return BATTLE SHORT switch to OFF position.
11. Disconnect negative battery cable.
12. If switch fails to meet continuity requirements, replace low oil pressure switch (Figure 1, Item 1).
13. If replacement is not needed, connect electrical leads to low oil pressure switch (Figure 1, Item 1) and remove tags.
14. Connect negative battery cable and close left side engine access door.

END OF TASK

REMOVAL

WARNING

The high pressure oil system operates at high temperature and pressure. Contact with hot oil can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Wear heat resistant gloves and avoid contacting hot surfaces. Do not allow hot oil or components to contact skin or hands. Failure to comply with this warning can cause injury or death to personnel.

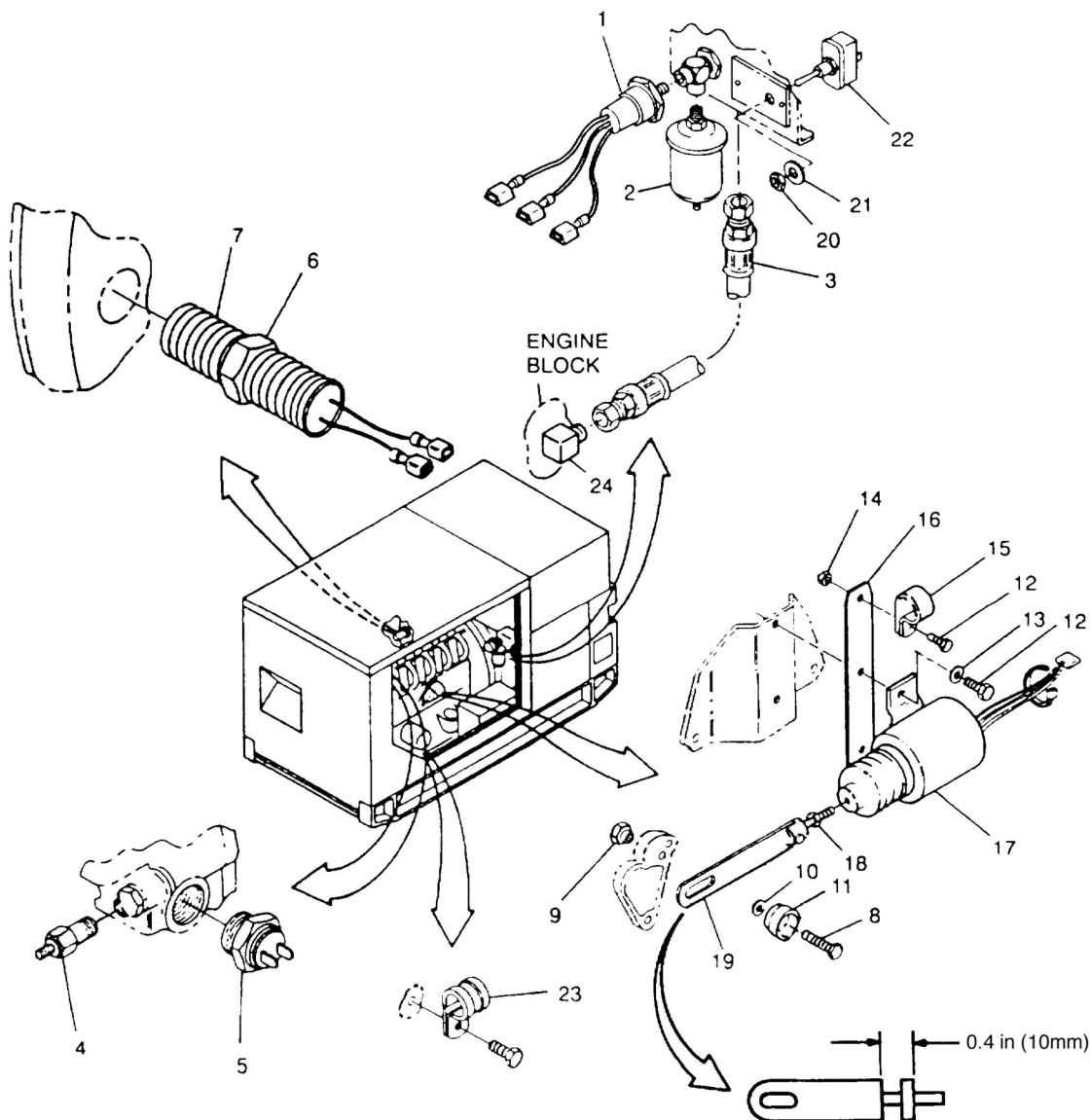


Figure 1. Engine Related Switches and Senders.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Tag and disconnect low oil pressure switch (Figure 1, Item 1) electrical leads.

REMOVAL – CONTINUED

4. Unscrew low oil pressure switch (Figure 1, Item 1) from fitting on left side rear engine wall.

END OF TASK**CLEANING AND INSPECTION**

1. Remove low oil pressure switch (Figure 1, Item 1) (Removal).

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

2. Clean low oil pressure switch (Figure 1, Item 1) with dry, filtered compressed air and wipe with a cleaning cloth (WP 0150, Item 7), lightly moistened with dry cleaning solvent (WP 0150, Item 20).
3. Inspect low oil pressure switch (Figure 1, Item 1) for cracked casing, stripped or damaged threads, corrosion, or other damage.
4. If no repair is needed, install low oil pressure switch (Figure 1, Item 1) (Installation).

END OF TASK**INSTALLATION**

1. Install low oil pressure switch (Figure 1, Item 1) into fitting on left side rear engine wall.
2. Connect electrical leads and remove tags.
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, OIL PRESSURE SENDER:
TESTING, REMOVAL, CLEANING AND INSPECTION, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required91D (1)
Assistant (1)**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

ReferencesLow Oil Pressure Switch (WP 0092)
Expendable and Durable Items List (WP 0150)**Materials/Parts**Oil Pressure Sender (If indications defer from test-
ing)
Goggles & Rubber Gloves
Oil pressure sender
Cleaning Cloth (WP 0150, Table 1, Item 7)
Dry Cleaning Solvent (WP 0150, Table 1, Item 20)**Equipment Condition**Shutdown Generator Set

TESTING**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

TESTING – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Disconnect electrical lead from oil pressure sender (WP 0092, Figure 1, Item 2).
4. Set multimeter for ohms and connect between sender terminal and casing.
5. Multimeter indication shall be between 216 and 264 ohms. If not, tap side of case and recheck.
6. Connect negative battery cable.
7. Start generator set.
8. As engine is cranking and accelerates to rated speed, observe multimeter. Indication shall decrease to between 100 and 33 ohms.
9. Shutdown generator set and disconnect negative battery cable.
10. Replace oil pressure sender (WP 0092, Figure 1, Item 2) if indications are not as above.
11. If replacement is not needed, connect electrical lead to oil pressure sender (WP 0092, Figure 1, Item 2).
12. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

The high pressure oil system operates at high temperature and pressure. Contact with hot oil can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services, and maintenance. Wear heat resistant gloves and avoid contacting hot surfaces. Do not allow hot oil or components to contact skin or hands. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Disconnect oil pressure sender (WP 0092, Figure 1, Item 2) electrical lead.
4. Unscrew and remove oil pressure sender (WP 0092, Figure 1, Item 2) from fitting on left side rear engine wall.

END OF TASK**CLEANING AND INSPECTION**

1. Remove oil pressure sender (WP 0092, Figure 1, Item 2) (Removal).

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

CLEANING AND INSPECTION – CONTINUED**WARNING**

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

2. Clean oil pressure sender (WP 0092, Figure 1, Item 2) with dry, filtered compressed air and wipe with a cleaning cloth (WP 0150, Item 7) lightly moistened with dry cleaning solvent (WP 00155, Item 20).
3. Inspect oil pressure sender (WP 0092, Figure 1, Item 2) for cracked casing, stripped or damaged threads, corrosion, and other visible damage.
4. Inspect oil line (WP 0092, Figure 1, Item 3) for deterioration and damage.
5. If no repair is needed, install oil pressure sender (WP 0092, Figure 1, Item 2) (Installation).

END OF TASK**INSTALLATION**

1. Install oil pressure sender (WP 0092, Figure 1, Item 2) into fitting on left side rear engine wall.
2. Connect electrical lead and remove tag.
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, COOLANT TEMPERATURE
SENDER: TESTING, REMOVAL, CLEANING AND INSPECTION, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Materials/Parts - cont'd

Dry Cleaning Solvent (WP 0150, Table 1, Item 20)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Assistant (1)

Materials/Parts

Coolant Temperature Sender (if indications defer from testing)

Goggles & Rubber Gloves

Coolant temperature sender

Cleaning Cloth (WP 0150, Table 1, Item 7)

References

Low Oil Pressure Switch (WP 0092)

Expendable and Durable Items List (WP 0150)

TESTING**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

TESTING – CONTINUED

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Disconnect electrical lead from coolant temperature sender (WP 0092, Figure 1, Item 4).
4. Set multimeter for ohms and connect positive lead to temperature sender terminal and negative lead to case. Multimeter indication shall be greater than 300 ohms.
5. Connect negative battery cable and start generator set.
6. Allow the engine to operate while observing multimeter.
7. Ohms indication should decrease as temperature rises.
8. Shutdown generator set and disconnect negative battery cable.
9. Replace coolant temperature sender (WP 0092, Figure 1, Item 4) if indications are not as above.
10. If replacement is not needed, connect electrical lead to coolant temperature sender (WP 0092, Figure 1, Item 4).
11. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

3. Disconnect coolant temperature sender (WP 0092, Figure 1, Item 4) electrical lead.
4. Unscrew coolant temperature sender (WP 0092, Figure 1, Item 4) from thermostat housing.

END OF TASK**CLEANING AND INSPECTION**

1. Remove coolant temperature sender (WP 0092, Figure 1, Item 4) (Removal).

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

CLEANING AND INSPECTION – CONTINUED**WARNING**

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

2. Clean coolant temperature sender (WP 0092, Figure 1, Item 4) with dry, filtered compressed air and cleaning cloth (WP 0150, Item 7) lightly moistened with dry cleaning solvent (WP 0150, Item 20).
3. Inspect coolant temperature sender (WP 0092, Figure 1, Item 4) for cracked casing, corrosion, and damaged threads and connector.
4. If no repair is needed, install coolant temperature sender (WP 0092, Figure 1, Item 4) (Installation).

END OF TASK**INSTALLATION**

1. Install coolant temperature sender (WP 0092, Figure 1, Item 4) into thermostat housing.
2. Connect electrical lead to coolant temperature sender (WP 0092, Figure 1, Item 4).
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, COOLANT HIGH TEMPERATURE SWITCH: REMOVAL, CLEANING AND INSPECTION, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter
Thermometer

Personnel Required

91D (1)
Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Low Oil Pressure Switch (WP 0092)
Expendable and Durable Items List (WP 0150)

Materials/Parts

Antifreeze & Water
Coolant Temperature Switch (if it fails during testing)
Gloves, Protective Clothing & Goggles
Suitable Container
Cleaning Cloth (WP 0150, Table 1, Item 7)
Dry Cleaning Solvent (WP 0150, Table 1, Item 20)

Equipment Condition

Shutdown Generator Set (Allow System to Cool)

REMOVAL

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

3. Tag and disconnect coolant high temperature switch (WP 0092, Figure 1, Item 5) electrical leads.
4. Unscrew coolant high temperature switch (WP 0092, Figure 1, Item 5) from thermostat housing.

END OF TASK**CLEANING AND INSPECTION**

1. Remove coolant high temperature switch (WP 0092, Figure 1, Item 5) (Removal).

CLEANING AND INSPECTION – CONTINUED**WARNING**

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

2. Clean coolant high temperature switch (WP 0092, Figure 1, Item 5) with dry, filtered compressed air and cleaning cloth (WP 0150, Item 7) lightly moistened with dry cleaning solvent (WP 00154, Item 20).
3. Inspect coolant high temperature switch (WP 0092, Figure 1, Item 5) for cracked casing, corrosion, stripped or damaged threads, and bent or broken connector pins.
4. If no repair is needed, install coolant high temperature switch (WP 0092, Figure 1, Item 5) (Installation).

END OF TASK**TESTING****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

TESTING – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Remove coolant high temperature switch (WP 0092, Figure 1, Item 5) (Removal).
2. Suspend coolant high temperature switch (WP 0092, Figure 1, Item 5) in a container of 50/50 mixture of antifreeze and water so that sensing element is completely immersed but not touching sides or bottom of container.
3. Suspend a reliable thermometer in container. Do not allow end of thermometer to rest on bottom of container.
4. Set multimeter for ohms and connect between coolant high temperature switch (WP 0092, Figure 1, Item 5) terminals. Multimeter should indicate open circuit.
5. Gradually heat antifreeze/water mixture, stirring so that heat will be evenly distributed and observe thermometer and multimeter.
6. At between 220 and 230 °F (105 and 110 °C), multimeter should indicate continuity.
7. Replace coolant high temperature switch (WP 0092, Figure 1, Item 5) if it fails to operate as above.
8. If replacement is not needed, install coolant high temperature switch (WP 0092, Figure 1, Item 5) (Installation).

END OF TASK**INSTALLATION**

1. Install coolant high temperature switch (WP 0092, Figure 1, Item 5) in thermostat housing.
2. Connect electrical leads and remove tags.
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, MAGNETIC PICKUP:
REMOVAL, CLEANING AND INSPECTION, INSTALLATION, ADJUSTMENT**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required91D (1)
Assistant (1)**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

ReferencesLow Oil Pressure Switch (WP 0092)
Expendable and Durable Items List (WP 0150)**Materials/Parts**Gloves (Rubber), Protective Clothing & Goggles
Cleaning Cloth (WP 0150, Table 1, Item 7)
Dry Cleaning Solvent (WP 0150, Table 1, Item 20)
Dry, Filtered Compressed Air**Equipment Condition**Shutdown Generator Set

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.

NOTE

Magnetic pickup is located on right side of flywheel housing.

3. Tag and disconnect magnetic pickup (WP 0092, Figure 1, Item 7) electrical leads.
4. Loosen nut (WP 0092, Figure 1, Item 6) and unscrew magnetic pickup (WP 0092, Figure 1, Item 7) from flywheel housing.

END OF TASK**CLEANING AND INSPECTION**

1. Remove magnetic pickup (WP 0092, Figure 1, Item 7) (Removal).

WARNING

Cleaning solvent is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with cleaning solvent. Avoid repeated or prolonged contact. Work in ventilated area only. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

2. Clean magnetic pickup (WP 0092, Figure 1, Item 7) with dry, filtered compressed air and wipe with a cleaning cloth (WP 0150, Item 7) lightly moistened with dry cleaning solvent (WP 0150, Item 20).
3. Inspect magnetic pickup (WP 0092, Figure 1, Item 7) for cracked casing, stripped or damaged threads, corrosion, or other visible damage.
4. If no repair is needed, install magnetic pickup (WP 0092, Figure 1, Item 7) (Installation).

END OF TASK**INSTALLATION**

1. Screw magnetic pickup (WP 0092, Figure 1, Item 7) into flywheel housing until pickup bottoms out on flywheel.
2. Back magnetic pickup (WP 0092, Figure 1, Item 7) out 1-1/2 turns and finger tighten nut (WP 0092, Figure 1, Item 6).
3. Connect electrical leads and remove tags.

INSTALLATION – CONTINUED

4. Adjust magnetic pickup (WP 0092, Figure 1, Item 7) (Adjustment).
5. Connect negative battery cable and close both engine access doors.

END OF TASK**ADJUSTMENT**

1. Shutdown generator set.
2. Open both engine access doors and disconnect negative battery cable.
3. Set multimeter for AC volts and connect to terminals 3 and 6 on crank disconnect switch (WP 0020, Figure 1, Item 35).
4. Connect negative battery cable and dead crank engine with DEAD CRANK switch.

CAUTION

Do not adjust magnetic pickup (WP 0088, Figure 1, Item 7) inward more than 1/8 turn each time or damage to magnetic pickup (7) may result.

5. Multimeter should read 2 to 3 VAC. Adjust magnetic pickup (WP 0092, Figure 1, Item 7) in or out, no more than 1/8 of a turn at a time, to obtain proper reading.
6. Tighten nut (WP 0092, Figure 1, Item 6) and close both engine access doors.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, FUEL SOLENOID:
TESTING, INSPECTION, REMOVAL, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required - cont'd

Assistant (1)

Materials/PartsGloves (Rubber), Protective Clothing & Goggles
Fuel solenoid
Sealant (WP 0150, Table 1, Item 17)**References**Low Oil Pressure Switch (WP 0092)
Expendable and Durable Items List (WP 0150)**Personnel Required**

91D (1)

Equipment ConditionShutdown Generator Set

TESTING**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

TESTING – CONTINUED

1. Open left side engine access door and disconnect negative battery cable.
2. Measure from fuel solenoid (WP 0092, Figure 1, Item 17) housing to nut (WP 0092, Figure 1, Item 18) and note measurement.
3. Tag, disconnect, and insulate wire 113B from starter solenoid and connect negative battery cable.
4. Move generator set MASTER SWITCH to START position and observe that fuel solenoid linkage (WP 0092, Figure 1, Item 19) retracts.
5. Release MASTER SWITCH to RUN position, ensure fuel solenoid linkage (WP 0092, Figure 1, Item 19) remains retracted, and measure from solenoid (WP 0092, Figure 1, Item 17) housing to nut (WP 0092, Figure 1, Item 18) again. Difference in measurement from Step 2 should be 1 in (2.54 cm).
6. Position MASTER SWITCH to OFF.
7. Repeat test several times to ensure proper performance of fuel solenoid (WP 0092, Figure 1, Item 17).
8. If fuel solenoid (WP 0092, Figure 1, Item 17) does not travel its full 1 in (2.54 cm), the solenoid is defective and must be replaced.
9. Disconnect negative battery cable, connect wire 113B to starter solenoid, and remove tag.
10. Connect negative battery cable and close left side engine access door.

END OF TASK**INSPECTION**

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Inspect fuel solenoid (WP 0092, Figure 1, Item 17) for damage and loose connections.
4. Connect negative battery cable and close left side engine access door.

END OF TASK**REMOVAL****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Disconnect and tag electrical connector to fuel solenoid (WP 0092, Figure 1, Item 17).
4. Disconnect linkage (WP 0092, Figure 1, Item 19) from engine governor cam by removing bolt (WP 0092, Figure 1, Item 8), threaded bushing (WP 0092, Figure 1, Item 9), washer (WP 0092, Figure 1, Item 10), and spacer (WP 0092, Figure 1, Item 11).
5. Remove bolts (WP 0092, Figure 1, Item 12), washer (WP 0092, Figure 1, Item 13), nut (WP 0092, Figure 1, Item 14), clamp (WP 0092, Figure 1, Item 15), strap (WP 0092, Figure 1, Item 16), and fuel solenoid (WP 0092, Figure 1, Item 17).

REMOVAL – CONTINUED

6. Loosen jamnut (WP 0092, Figure 1, Item 18) and remove linkage (WP 0092, Figure 1, Item 19) from fuel solenoid (WP 0092, Figure 1, Item 17).

END OF TASK**REPAIR**

Repair fuel solenoid assembly by replacing electrical contacts, fuel solenoid (WP 0092, Figure 1, Item 17), and damaged linkage (WP 0092, Figure 1, Item 19).

END OF TASK**INSTALLATION**

1. Insert linkage (WP 0092, Figure 1, Item 19) in fuel solenoid (WP 0092, Figure 1, Item 17) and apply sealant (WP 0150, Item 18) on threads. Tighten jamnut (WP 0092, Figure 1, Item 18) next to rubber bellows to a distance of 0.4 in (10 mm) between the back side of the linkage (WP 0092, Figure 1, Item 19) and the far side of the jamnut (see WP 0092, Figure 1, Item 18).
2. Install fuel solenoid (WP 0092, Figure 1, Item 17), clamp (WP 0092, Figure 1, Item 15), and strap (WP 0092, Figure 1, Item 16) to engine mount plate with bolts (WP 0092, Figure 1, Item 12), washer (WP 0092, Figure 1, Item 13), and nut (WP 0092, Figure 1, Item 14).
3. Connect linkage (WP 0092, Figure 1, Item 19) to engine governor cam with bolt (WP 0092, Figure 1, Item 8), spacer (WP 0092, Figure 1, Item 11), washer (WP 0092, Figure 1, Item 10), and threaded bushing (WP 0092, Figure 1, Item 9). Insert bolt (WP 0092, Figure 1, Item 8) through spacer (WP 0092, Figure 1, Item 11) and washer (WP 0092, Figure 1, Item 10). Apply sealant (WP 0150, Item 18) on threads of threaded bushing (WP 0092, Figure 1, Item 9). Insert threaded part of bolt (WP 0092, Figure 1, Item 8) which extends beyond the spacer (WP 0092, Figure 1, Item 11) and washer (WP 0092, Figure 1, Item 10) through the linkage (WP 0092, Figure 1, Item 19) slot. Secure in place by tightening the threaded bushing (WP 0092, Figure 1, Item 9) to the bolt (WP 0092, Figure 1, Item 8). Thread the knob assembly into the stop lever located on the engine. Torque threaded bushing (WP 0092, Figure 1, Item 9) to 40-45 in•lbs (4.5-5.08 N•m).
4. Connect electrical connector to fuel solenoid (WP 0092, Figure 1, Item 17) and remove tag.
5. Disconnect wire 113B from starter solenoid and connect negative battery cable.
6. Move generator set MASTER SWITCH to START position and ensure engine governor linkage contacts lower set screw stop.
7. Move MASTER SWITCH to OFF position and ensure governor linkage contacts upper set screw stop.
8. Adjust solenoid linkage (WP 0092, Figure 1, Item 19) as necessary to ensure contact with both stops.
9. Disconnect negative battery cable, connect wire 113B at starter solenoid, and reconnect negative battery cable.
10. Close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, DEAD CRANK
SWITCH: INSPECTION, REMOVAL, TESTING, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Assistant (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

WP 0092

Materials/Parts

New Lockwashers

Equipment ConditionShutdown Generator Set

INSPECTION

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Inspect DEAD CRANK switch (WP 0092, Figure 1, Item 22) for damage and loose connections.
4. Connect negative battery cable and close engine access door.

END OF TASK**REMOVAL****WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

REMOVAL – CONTINUED**WARNING**

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove nut (WP 0092, Figure 1, Item 20) and washer (WP 0092, Figure 1, Item 21).
4. Remove DEAD CRANK switch (WP 0092, Figure 1, Item 22) from mounting bracket on left rear engine wall.
5. Tag and disconnect DEAD CRANK switch (WP 0092, Figure 1, Item 22) electrical leads.

END OF TASK**TESTING****WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Remove DEAD CRANK switch (WP 0092, Figure 1, Item 22) (Removal).
2. Set multimeter for ohms, and with DEAD CRANK switch (WP 0092, Figure 1, Item 22) in NORMAL position, check for continuity between contacts 2 and 3.
3. Position switch to CRANK and check continuity between contacts 1 and 2.
4. If DEAD CRANK switch (WP 0092, Figure 1, Item 22) fails continuity checks, replace switch.
5. Install DEAD CRANK switch (WP 0092, Figure 1, Item 22) (Installation).

END OF TASK**INSTALLATION**

1. Connect electrical leads to DEAD CRANK switch (WP 0092, Figure 1, Item 22) and remove tags.
2. Install DEAD CRANK switch (WP 0092, Figure 1, Item 22) in mounting bracket with washer (WP 0092, Figure 1, Item 21) and nut (WP 0092, Figure 1, Item 20).
3. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF ENGINE ACCESSORIES, ADJUSTING
FREQUENCY DROOP AT ENGINE GOVERNOR: ADJUSTMENT**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Diesel Fuel

Personnel Required

91D (1)

Assistant (1)

References

Equipment Description and Data (WP 0002)

Radiator (WP 0072)

Equipment Condition

Generator Shutdown as required

Engine Control Switch OFF/RESET

Battery Disconnect Switch OFF

Dead Crank Switch OFF

Properly Grounded Before Starting

Special Environmental Condition

Adequately Ventilated Work Area

Diesel Fuel is toxic to eyes, skin, and respiratory tract

ADJUSTMENT**WARNING**

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

ADJUSTMENT – CONTINUED**WARNING**

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Batteries give off a flammable gas. Do not smoke or use open flame when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

WARNING

Battery acid can cause burns to unprotected skin. Wear safety goggles and chemical gloves and avoid acid splash while working on batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Fuels used in the generator set are flammable. Do not smoke or use open flames when performing maintenance. Failure to comply with this warning can cause injury or death to personnel, and damage to the generator set.

NOTE

Frequency droop should be checked whenever maintenance has been performed on the entire governor, or the engine assembly has been replaced. Adjust frequency droop as follows if droop does not meet the performance characteristics listed in WP 0002, Table 2.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove left side fan guard (WP 0072, Removal).
4. Remove plug (Figure 1, Item 1) from engine governor housing (Figure 1, Item 3).

ADJUSTMENT – CONTINUED**NOTE**

Do not turn adjustment screw more than one turn at a time.

5. Using a 5 mm hex key, at least 5 in long, adjust screw (Figure 1, Item 2) clockwise (CW) to decrease the amount of droop.
6. Install plug (Figure 1, Item 1), connect negative battery cable, and close left side engine access door.
7. Start generator set and check frequency droop.
8. Shutdown generator set.
9. Repeat procedures until frequency droop meets performance characteristics listed in WP 0002, Table 2.
10. Open left side engine access door, install left fan guard (WP 0072, Installation), and close left side engine access door.

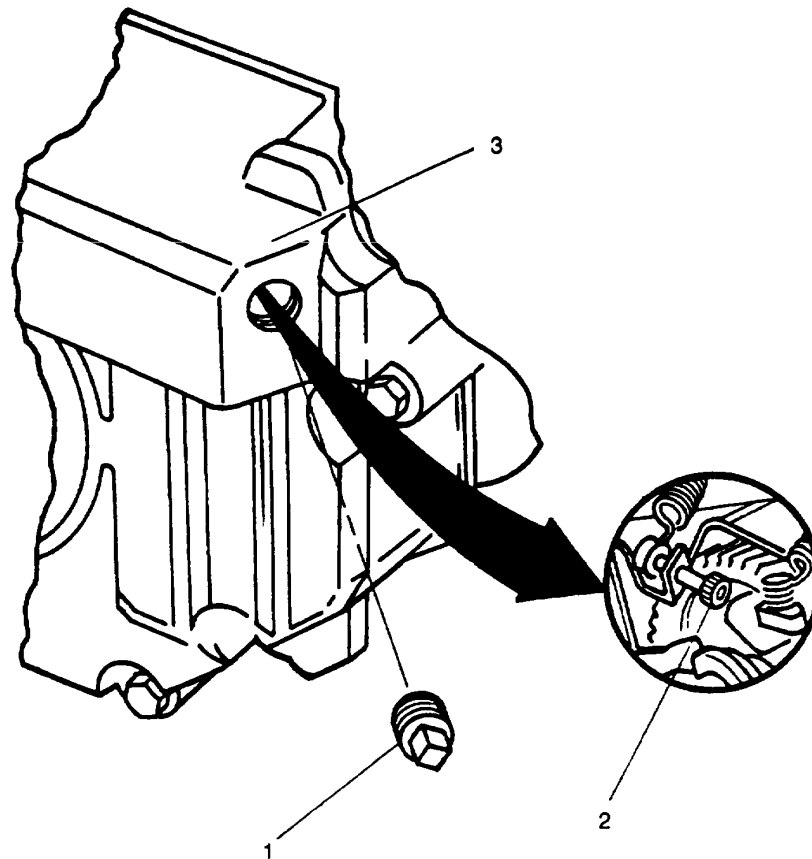


Figure 1. Frequency Droop Adjustment.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF SKID BASE, SKID BASE: REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof, Goggles
CARC Paint
Fine Abrasive Paper (WP 0150, Table 1, Item 16)
Breathing Protection/Mask

Personnel Required

91D (1)
Assistant (1)

References

Batteries (WP 0010)
Front Housing Section (WP 0017)
Rear Housing Section (WP 0018)
Fuel Tank (WP 0085)
Engine and Generator Assembly (WP 0104)

Equipment Condition

Generator Shutdown as required
Engine Cool
Well ventilated, Temperature & Engineering Controlled, painting area

REMOVAL**WARNING**

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Support components when removing attaching hardware or component may fall. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

1. Shutdown generator set.
2. Remove batteries (WP 0010, Removal).
3. Remove generator set front housing section (WP 0017, Removal).

REMOVAL – CONTINUED

4. Remove generator set rear housing section (WP 0018, Removal).
5. Remove fuel tank (WP 0085, Removal).
6. Remove engine and generator (WP 0104, Removal).
7. Remove clip halves (Figure 1, Item 1) and insulation (Figure 1, Item 2) from plate (Figure 1, Item 5).
8. Remove nuts (Figure 1, Item 3), bolts (Figure 1, Item 4), and plate (Figure 1, Item 5) from skid base (Figure 1, Item 6).

END OF TASK**INSPECTION**

Inspect skid base for cracks, broken welds, corrosion, or other obvious damage.

END OF TASK**REPAIR****WARNING**

CARC paint is a health hazard, and is irritating to eyes, skin, and respiratory system. Wear protective eyewear, mask, and gloves when applying or removing CARC paint. Failure to comply with this warning can cause injury to personnel.

WARNING

Solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to comply with this warning can cause injury to personnel, and damage to the equipment.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi pressure when using compressed air. Failure to comply with this warning can cause injury to personnel.

WARNING

Avoid breathing fumes generated by soldering. Eye protection is required. Good general ventilation is normally adequate. Failure to comply with this warning can cause injury to personnel.

Repair of skid base will be limited to corrosion control and spot welding minor cracks. If major structural damage to skid base has occurred, replace skid base.

END OF TASK**INSTALLATION**

1. Install insulation (Figure 1, Item 2) on plate (Figure 1, Item 5) with clip halves (Figure 1, Item 1).
2. Install plate (Figure 1, Item 5) to skid base (Figure 1, Item 6) with bolts (Figure 1, Item 4) and nuts (Figure 1, Item 3).

INSTALLATION – CONTINUED

3. Install engine and generator (WP 0104, Installation).
4. Install fuel tank (WP 0085, Installation).
5. Install generator set rear housing section (WP 0018, Installation).
6. Install generator set front housing section (WP 0017, Installation).
7. Install batteries (WP 0010, Installation)

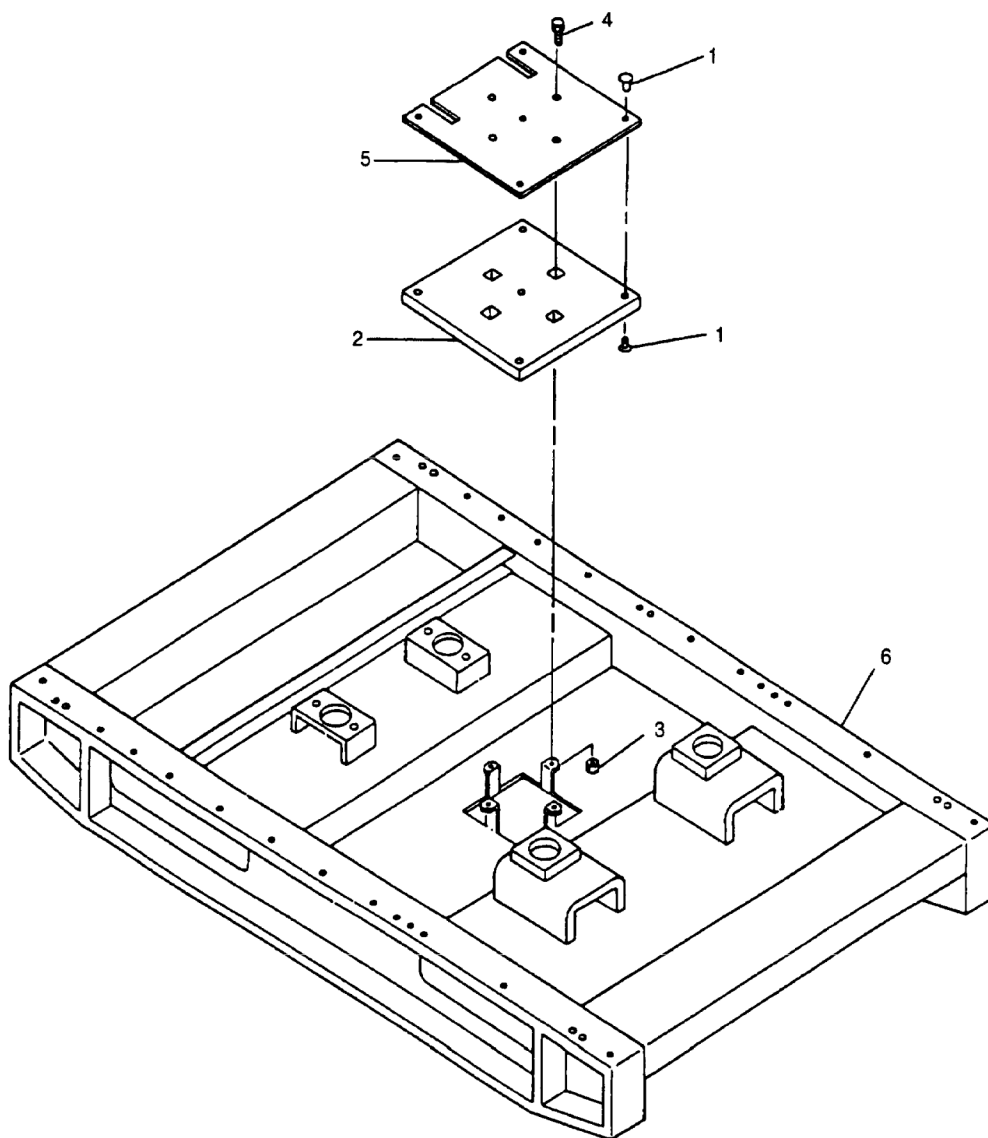


Figure 1. Skid Base.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF LOAD OUTPUT TERMINAL BOARD ASSEMBLY, LOAD OUTPUT
TERMINAL BOARD ASSEMBLY: REMOVAL, INSPECTION, REPAIR, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

ReferencesLoad Output Terminals (WP 0102)
Varistors (WP 0103)**Materials/Parts**

New Lockwashers

Equipment Condition

Shutdown Generator Set

Personnel Required91D (1)
Assistanct (1)

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL

1. Shutdown generator set.

REMOVAL – CONTINUED

2. Open left side engine access door and disconnect negative battery cable.
3. Open load terminal board access door and disconnect load cables.
4. Remove nuts (Figure 1, Item 1), lockwashers (Figure 1, Item 2), washers (Figure 1, Item 3), and bolts (Figure 1, Item 4) securing ground plane bracket (Figure 1, Item 5) to generator set. Discard lockwashers (Figure 1, Item 2).
5. Remove nuts (Figure 1, Item 6) and bolts (Figure 1, Item 7) securing load output terminal board assembly mounting bracket (Figure 1, Item 8) to generator set.
6. Remove nuts (Figure 1, Item 9) and copper washers (Figure 1, Item 10). Tag and disconnect main power leads and varistor leads (Figure 1, Item 11) from load terminals (Figure 1, Item 12).
7. Remove ground plane bracket (Figure 1, Item 5) and terminal board (Figure 1, Item 13) from generator set as an assembly.
8. Remove load terminals (Figure 1, Item 12) from terminal board (Figure 1, Item 13) (WP 0102, Removal).
9. Remove EMI filter (Figure 1, Item 14) positioned between LO and GND terminals (Figure 1, Item 12).
10. Remove nut (Figure 1, Item 15), washer (Figure 1, Item 16), and bus bar (Figure 1, Item 17) from standoff (Figure 1, Item 18).
11. Remove nuts (Figure 1, Items 19 and 21), washers (Figure 1, Items 20 and 22), ground bar (Figure 1, Item 23), and standoffs (Figure 1, Items 18 and 24) from terminal board (Figure 1, Item 13).
12. Disconnect varistor leads (Figure 1, Item 11) from varistors (Figure 1, Item 25) and remove leads from assembly.
13. Remove varistors (Figure 1, Item 25) from load terminal board assembly (WP 0103, Removal).
14. Remove EMI filters (Figure 1, Item 26) positioned between load terminals (Figure 1, Item 12) and varistors (Figure 1, Item 25).
15. Remove nuts (Figure 1, Item 27) and bolts (Figure 1, Item 28) and separate ground plane bracket (Figure 1, Item 5) and terminal board (Figure 1, Item 13).
16. Remove nuts (Figure 1, Item 29), lockwashers (Figure 1, Item 30), bolts (Figure 1, Item 31), washers (Figure 1, Item 32), and mounting bracket (Figure 1, Item 8) from terminal board (Figure 1, Item 13). Discard lockwashers (Figure 1, Item 30).
17. Remove nuts (Figure 1, Item 33), bolts (Figure 1, Item 34), bracket (Figure 1, Item 35), and wrench (Figure 1, Item 36) from generator set. Untie cord (Figure 1, Item 37) and remove from wrench (Figure 1, Item 36).

END OF TASK**INSPECTION**

1. Remove load output terminal board assembly (Removal), Steps 1 through 7.
2. Inspect terminal output board components for cracks, corrosion, and obvious damage.
3. Inspect threaded components for stripped threads.
4. Inspect varistor electrical leads for damaged insulation and loose terminals.
5. Replace damaged and defective parts.
6. Install load output terminal board assembly (Installation), Steps 11 through 17

END OF TASK

REPAIR

Repair load output terminal board assembly by replacing wires, load terminals, EMI filters, and varistors.

END OF TASK

INSTALLATION

1. Tie cord (Figure 1, Item 37) to wrench (Figure 1, Item 36). Install wrench (Figure 1, Item 36) and bracket (Figure 1, Item 35) in generator set with bolts (Figure 1, Item 34) and nuts (Figure 1, Item 33).
2. Align terminal board (Figure 1, Item 13) with ground plane bracket (Figure 1, Item 5) and install bolts (Figure 1, Item 28) and nuts (Figure 1, Item 27).
3. Position EMI filters (Figure 1, Item 26) between varistors (Figure 1, Item 25) and L1, L2, and L3 load terminals (Figure 1, Item 12) mounting holes.
4. Install varistors (Figure 1, Item 25) (WP 0103, Installation).
5. Install standoffs (Figure 1, Items 24 and 18) and ground bar (Figure 1, Item 23) to terminal board assembly with washers (Figure 1, Items 20 and 22) and nuts (Figure 1, Items 19 and 21).
6. Install bus bar (Figure 1, Item 17) on standoff (Figure 1, Item 18) with washer (Figure 1, Item 16) and nut (Figure 1, Item 15).
7. Position EMI filter (Figure 1, Item 14) between LO and GND load terminals (Figure 1, Item 12) mounting holes.
8. Install load terminals (Figure 1, Item 12) (WP 0102, Installation).
9. Install mounting bracket (Figure 1, Item 8) on terminal board assembly with bolts (Figure 1, Item 31), washers (Figure 1, Item 32), new lockwashers (Figure 1, Item 30), and nuts (Figure 1, Item 29).
10. Connect varistor electrical leads (Figure 1, Item 11) to varistors (Figure 1, Item 25).

CAUTION

Main electrical leads must be installed at 2 o'clock position as shown in Figure 1 to prevent chafing of electrical leads. Ensure varistor leads do not change position. Inspect all wires from terminal board to load contactor for chafing. Make sure that wires are not in contact with metal surfaces.

11. Position load output terminal board assembly in generator set and connect varistor leads (Figure 1, Item 11) and main electrical leads to load terminals (Figure 1, Item 12) with copper washers (Figure 1, Item 10) and nuts (Figure 1, Item 9). Remove tags.
12. Install wire ties in 2 places around all four power leads approximately 2 in (5.0 cm) and 16 in (40.6 cm) from load terminal board. Ensure that all four power leads are installed in cable clamp (WP 0020, Figure 1, Item 48) and power cable clamp (WP 0018, Figure 1, Item 73).
13. Secure terminal board assembly mounting bracket (Figure 1, Item 8) to generator set with bolts (Figure 1, Item 7) and nuts (Figure 1, Item 6).
14. Align terminal board assembly in generator set at ground plane bracket (Figure 1, Item 5) attaching point.
15. Secure terminal board assembly to generator set skid with bolts (Figure 1, Item 4), new lockwashers (Figure 1, Item 2), washers (Figure 1, Item 3), and nuts (Figure 1, Item 1).
16. Connect load cables and close load terminal board access door.
17. Connect negative battery cable and close left side engine access door.

INSTALLATION – CONTINUED

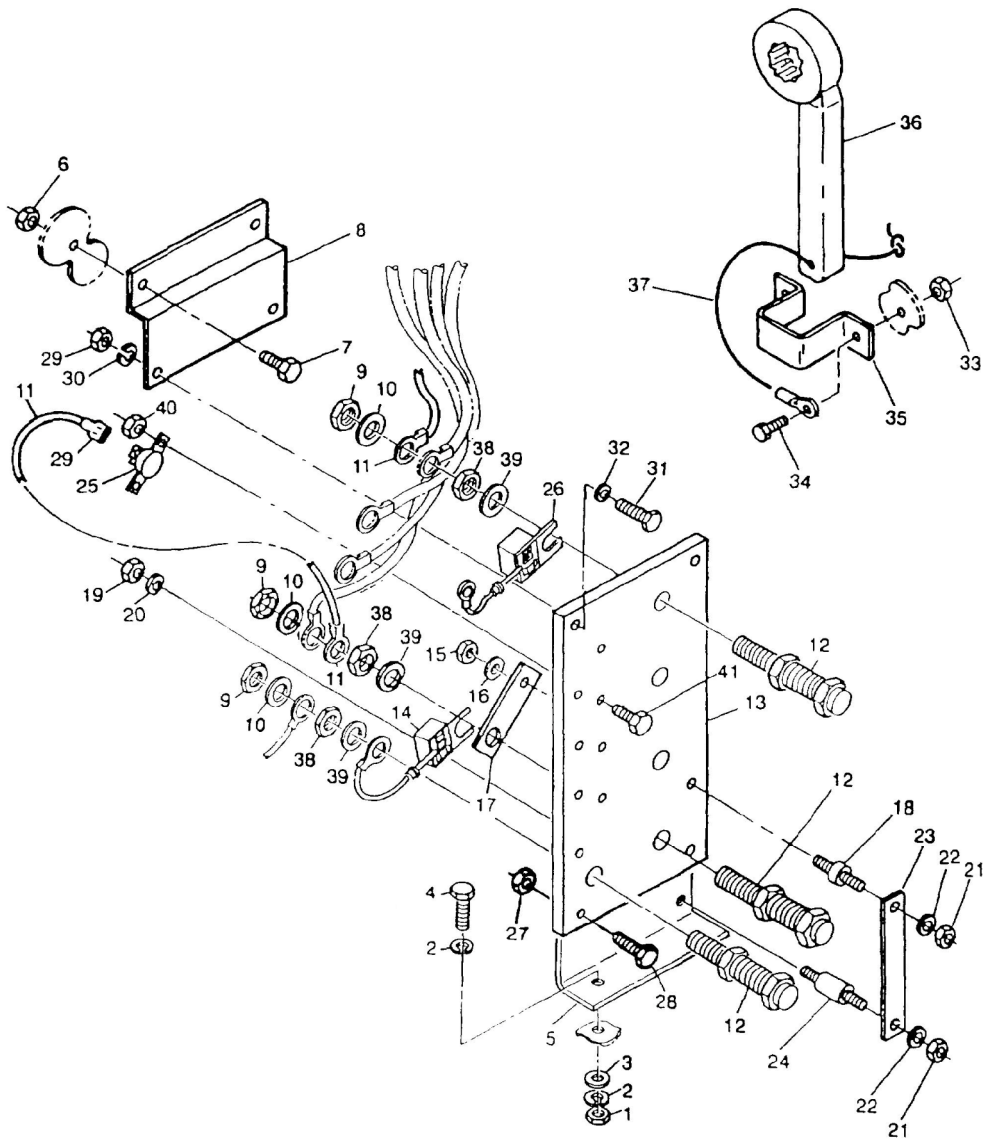


Figure 1. Load Output Terminal Board Assembly.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF LOAD OUTPUT TERMINAL BOARD ASSEMBLY,
LOAD OUTPUT TERMINALS: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

Load Output Terminal Board Assembly (WP 0101)

Personnel Required

91D (1)

Equipment ConditionShutdown Generator Set

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable,
3. Open load terminal board access door and disconnect load cables.

REMOVAL – CONTINUED

4. Remove load output terminal board assembly from generator set (WP 0101, Removal), Steps 3 through 7.
5. Remove nuts (WP 0101, Figure 1, Item 38), copper washers (WP 0101, Figure 1, Item 39), and load terminals (WP 0101, Figure 1, Item 12) from load output terminal board assembly.

END OF TASK**INSPECTION**

1. Remove load output terminals (Removal).
2. Inspect load terminals for stripped threads or other obvious damage.
3. Replace damaged load terminals as necessary.
4. Install load output terminals (Installation).

END OF TASK**INSTALLATION**

1. Install load output terminals (WP 0101, Figure 1, Item 12) on load output terminal board assembly with copper washers (WP 0101, Figure 1, Item 39) and nuts (WP 0101, Figure 1, Item 38).

NOTE

Ensure GND load terminal passes through ground plane bracket (WP 0101, Figure 1, Item 5) and LO load terminal passes through bus bar (WP 0101, Figure 1, Item 17).

2. Install load output terminal board assembly in generator set (WP 0101, Installation), Steps 11 through 13.
3. Connect load cables and close load terminal board access door.
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**MAINTENANCE OF LOAD OUTPUT TERMINAL BOARD
ASSEMBLY, VARISTORS: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

References

Load Output Terminal Board Assembly (WP 0101)

Materials/Parts

Varistors (if defective)

Equipment ConditionShutdown Generator Set

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Shutdown generator set before performing inspection of wiring. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Shutdown generator set.

REMOVAL – CONTINUED

2. Open left side engine access door and disconnect negative battery cable.
3. Remove load output terminal board assembly from generator set (WP 0101, Removal), Steps 3 through 7.
4. Tag and disconnect varistor leads (WP 0101, Figure 1, Item 11) from varistors (WP 0101, Figure 1, Item 25).
5. Remove nuts (WP 0101, Figure 1, Item 40), bolts (WP 0101, Figure 1, Item 41), and varistors (WP 0101, Figure 1, Item 25) from load output terminal board assembly.

END OF TASK**INSPECTION**

1. Remove varistors (Removal).
2. Inspect varistors for obvious external damage.
3. Set multimeter for ohms and test each varistor by connecting multimeter to varistor terminals 1 and 2. Note multimeter indication.
4. Reverse multimeter leads and note multimeter indication.
5. Multimeter indications should be infinite ohms in both directions.
6. Varistors are defective and must be replaced if indications are other than above.
7. Install varistors (Installation).

END OF TASK**INSTALLATION**

1. Install varistors (WP 0101, Figure 1, Item 25), on load output terminal board assembly with bolts (WP 0101, Figure 1, Item 41) and nuts (WP 0101, Figure 1, Item 40).
2. Connect varistor leads (WP 0101, Figure 1, Item 11) to varistors (WP 0101, Figure 1, Item 25) and remove tags.
3. Install load output terminal board assembly in generator set (WP 0101, Installation), Steps 11 through 13.
4. Connect negative battery cable and close left side engine access door.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
**REMOVAL AND INSTALLATION OF MAJOR COMPONENTS,
ENGINE AND GENERATOR ASSEMBLY: REMOVAL, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
Overhead Hoist (with at least 2,000 lb rated capacity)

Materials/Parts

Overhead hoist
New Lockwashers

Personnel Required

91D (1)
Assistant (1)

References

TM-9-2815-252-24
Batteries (WP 0010)
Battery Charging Alternator (WP 0012)
Control Box Top Panel (WP 0014)

References - cont'd

Top Housing Panel (WP 0015)
Rear Housing Section (WP 0018)
Muffler (WP 0067)
Radiator (WP 0072)
Fuel Transfer Pump (WP 0087)
Oil Drain Line (WP 0090)
Frequency Adjust Control Cable (WP 0091)
Low Oil Pressure Switch (WP 0092)
Load Output Terminal Board Assembly (WP 0101)
Output Box Assembly (WP 0058)
Generator Assembly (MEP-802A) (WP 0107)
Generator Assembly (MEP-812A) (WP 0108)

Equipment Condition

Battery Disconnect Switch OFF
ENGINE CONTROL Switch OFF/RESET
DEAD CRANK SWITCH OFF

GENERAL

The engine and generator are bolted together at the engine flywheel housing. The engine-generator assembly is mounted on the skid base at four points. The engine-generator should be removed as an assembly; however, when removing the generator only, the engine can remain attached to the skid base with adequate blocking of the flywheel housing to support the rear of the engine.

REMOVAL**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead when the batteries are fully disconnected. Disconnect the batteries before performing maintenance on the slave receptacle. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

Support components when removing attaching hardware or component may fall. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED

1. Shutdown generator set.
2. Open battery access door and remove batteries (WP 0010, Removal).
3. Remove screws (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and fan guards (WP 0072, Figure 1, Item 4) from both sides of generator set.

NOTE

If removing the generator only, proceed to Step 6.

4. Drain engine oil into a suitable container.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

5. Drain coolant into a suitable container.
6. Remove control box top panel (WP 0014, Removal, Steps 4 through 6).
7. Remove top housing panel (WP 0015, Removal, Step 3).
8. Tag and disconnect wires at terminal board TB3 (WP 0058, Figure 1, Item 16) leading from generator.
9. Remove nuts (WP 0101, Figure 1, Item 1), lockwashers (WP 0101, Figure 1, Item 2), washers (WP 0101, Figure 1, Item 3), and bolts (WP 0101, Figure 1, Item 4) securing load output terminal board assembly (WP 0101, Figure 1, Item 13) to skid base. Discard lockwashers (WP 0101, Figure 1, Item 2).
10. Remove nut (WP 0018, Figure 1, Item 5) and bolt (WP 0018, Figure 1, Item 4) securing center door post (WP 0018, Figure 1, Item 6) to skid base.
11. Remove bolts (WP 0018, Figure 1, Item 7), nuts (WP 0018, Figure 1, Item 8), lockwashers (WP 0018, Figure 1, Item 9), and washers (WP 0018, Figure 1, Item 10) securing lower door sill (WP 0018, Figure 1, Item 11) to skid base. Discard lockwashers (WP 0018, Figure 1, Item 9).

NOTE

If removing the generator only, proceed to Step 14.

12. Remove bolts (WP 0015, Figure 1, Item 18), lockwashers (WP 0015, Figure 1, Item 19), washers (WP 0015, Figure 1, Item 20), bolts (WP 0015, Figure 1, Item 21), and nuts (WP 0015, Figure 1, Item 22) securing air deflector panels (WP 0015, Figure 1, Item 23), (WP 0015, Figure 1, Item 24), and (WP 0015, Figure 1, Item 25) to front housing (WP 0015, Figure 1, Item 56). Discard lockwashers (WP 0015, Figure 1, Item 19).

NOTE

Fan shroud is in two pieces.

13. Remove bolts (WP 0072, Figure 1, Item 13) and nuts (WP 0072, Figure 1, Item 14) securing fan shroud (WP 0072, Figure 1, Item 15).
14. Loosen two clamps (WP 0064, Figure 1, Item 2) and remove hose (WP 0064, Figure 1, Item 3) from air cleaner (WP 0064, Figure 1, Item 7) and air intake manifold.

NOTE

If removing the generator only, proceed to Step 16.

15. Remove muffler (WP 0067, Removal).
16. From right side of generator set, perform following removal procedures:

REMOVAL – CONTINUED**NOTE**

Only the four pin connector J5 should be disconnected.

- a. Disconnect four pin connector J5 from under control box.
 - b. Tag and disconnect electrical connections to magnetic pickup (WP 0092, Figure 1, Item 7).
 - c. Remove starter (TM 9-2815-252-24).
 - d. Tag and disconnect electrical connections to alternator (WP 0012, Figure 1, Item 9).
 - e. Tag and disconnect electrical connections to heater plugs (TM 9-2815-252-24).
 - f. If removing engine and generator, disconnect coolant drain hose (WP 0072, Figure 1, Item 35) at engine block drain valve.
 - g. Remove bolts (WP 0015, Figure 1, Item 70), nut (WP 0015, Figure 1, Item 71), lockwasher (WP 0015, Figure 1, Item 72), washer (WP 0015, Figure 1, Item 73), mounting plate (WP 0015, Figure 1, Item 74), and grounding rods (WP 0015, Figure 1, Item 75). Discard lockwasher (WP 0015, Figure 1, Item 72).
17. Remove bolts (WP 0013, Figure 1, Item 80) and nuts (WP 0018, Figure 1, Item 81) securing door sills (WP 0018, Figure 1, Items 82 and 83) to center housing panel (WP 0018, Figure 1, Item 62).
 18. Remove bolts (WP 0018, Figure 1, Item 20), lockwashers (WP 0018, Figure 1, Item 21), and washers (WP 0018, Figure 1, Item 22) securing rear side housing panels (WP 0018, Figure 1, Items 23 and 24) to skid base. Discard lockwashers (WP 0018, Figure 1, Item 21).
 19. Remove nuts (WP 0018, Figure 1, Item 58), lockwashers (WP 0018, Figure 1, Item 59), washers (WP 0018, Figure 1, Item 60), and bolts (WP 0018, Figure 1, Item 61) securing center housing panel (WP 0018, Figure 1, Item 62) to skid base. Discard lockwashers (WP 0018, Figure 1, Item 59).
 20. Remove bolts (WP 0018, Figure 1, Item 12), nuts (WP 0018, Figure 1, Item 13), lockwashers (WP 0018, Figure 1, Item 14), and washers (WP 0018, Figure 1, Item 15) securing lifting ring brackets (WP 0018, Figure 1, Item 16) and lifting rings (WP 0018, Figure 1, Item 17) to skid base (both sides). Discard lockwashers (WP 0018, Figure 1, Item 14).
 21. From left side of generator set, perform following removal procedures:
 - a. Tag and disconnect electrical leads to fuel solenoid (WP 0092, Figure 1, Item 17).
 - b. Tag and disconnect electrical leads from coolant temperature sender (WP 0092, Figure 1, Item 4) and coolant high temperature switch (WP 0092, Figure 1, Item 5).
 - c. Remove nut (WP 0092, Figure 1, Item 14), bolt (WP 0092, Figure 1, Item 12), and clamp (WP 0092, Figure 1, Item 15) from fuel shutoff solenoid bracket (WP 0092, Figure 1, Item 16).

NOTE

If removing the generator only, proceed to sub-step f.

NOTE

Tag radiator hoses to indicate what each end is connected to and which end is connected to the radiator. This will be an aid during installation.

- d. Loosen clamps (WP 0072, Figure 1, Items 19 and 21). Tag and remove upper radiator hose (WP 0072, Figure 1, Item 20) and lower radiator hose (WP 0072, Figure 1, Item 22).
- e. Loosen clamp (WP 0090, Figure 1, Item 3) and disconnect oil drain hose (WP 0090, Figure 1, Item 4) from fitting (WP 0090, Figure 1, Item 8).

REMOVAL – CONTINUED

- f. Disconnect frequency control cable (WP 0091, Figure 1, Item 6) from mechanical governor.
- g. Remove fuel supply line (WP 0087, Figure 1, Item 2). Cap open ends.
- h. Remove fuel supply hose (WP 0087, Figure 1, Item 9) at fuel filter/water separator fitting (WP 0087, Figure 1, Item 18) and cap end.
- i. Disconnect fuel filter/water separator drain hose (WP 0087, Figure 1, Item 10) from fuel filter/water separator drain valve.
- j. Disconnect oil pressure line (WP 0092, Figure 1, Item 3) from engine block fitting (WP 0092, Figure 1, Item 24).
- k. Tag and disconnect electrical connections from low oil pressure switch (WP 0092, Figure 1, Item 1) and oil pressure sender (WP 0092, Figure 1, Item 2).

CAUTION

Wires running the length of the generator set on the left side have not been disconnected. Use care when lifting the rear generator set housing to avoid cutting or pulling these wires.

- 22. Using a suitable lifting device or an assistant, lift and rotate rear generator set housing assembly towards left side and front, clearing skid base.

NOTE

If removing the generator only, proceed to Step 24.

- 23. Disconnect and cap fuel return line at Number 2 injector (TM 9-2815-252-24).

WARNING

Rated capacity of overhead hoist should be at least 1,500 pounds (680 kg). Do not use a hoist with less capacity. Failure to comply with this warning can cause injury or death to personnel, and damage to equipment.

NOTE

If removing generator only, attach overhead lifting device to generator lifting point only.

- 24. Attach suitable overhead lifting device to lifting points of engine and generator. Take up slack.

NOTE

If removing the generator only, proceed to Step 26.

- 25. Remove nuts (Figure 1, Item 1), washers (Figure 1, Items 2 and 4), and mounting bolts (Figure 1, Item 3) from engine mounting points.
- 26. Remove nuts (Figure 1, Item 5), washers (Figure 1, Item 6) and (Figure 1, Item 8) and mounting bolts (Figure 1, Item 7) from generator mounting points.

NOTE

If engine and generator are to be removed as an assembly, perform Steps 27 and 28.

If removing only the generator, perform Steps 29 through 32.

- 27. Lift engine and generator assembly from skid base and move to appropriate maintenance area.
- 28. Remove generator from engine (WP 0107, Removal/Disassembly (MEP-802A)/WP 0108, Removal (MEP-812A)).
- 29. Loosen nuts (Figure 1, Item 1) at engine mounting points.

REMOVAL – CONTINUED

30. Raise generator approximately 1 in (2.54 cm) from generator mounting points.
31. Support rear of engine with wooden shims.
32. Remove generator from engine (WP 0107, Removal/Disassembly (MEP-802A)/WP 0108, Removal (MEP-812A)).
33. Remove generator snubbing washers (Figure 1, Item 9) and shock mounts (Figure 1, Item 10).
34. Remove snubbing washers (Figure 1, Item 11), nuts (Figure 1, Item 12), lock washers (Figure 1, Item 13), washers (Figure 1, Items 14 and 16), bolts (Figure 1, Item 15), and engine shock mounts (Figure 1, Item 17). Discard lockwashers (Figure 1, Item 13).

END OF TASK**INSTALLATION**

1. Install engine shock mounts (Figure 1, Item 17) with snubbing washers (Figure 1, Item 11), nuts (Figure 1, Item 12), new lockwashers (Figure 1, Item 13), washers (Figure 1, Items 14 and 16), and bolts (Figure 1, Item 15).
2. Install generator shock mounts (Figure 1, Item 10) and snubbing washers (Figure 1, Item 9).

INSTALLATION – CONTINUED

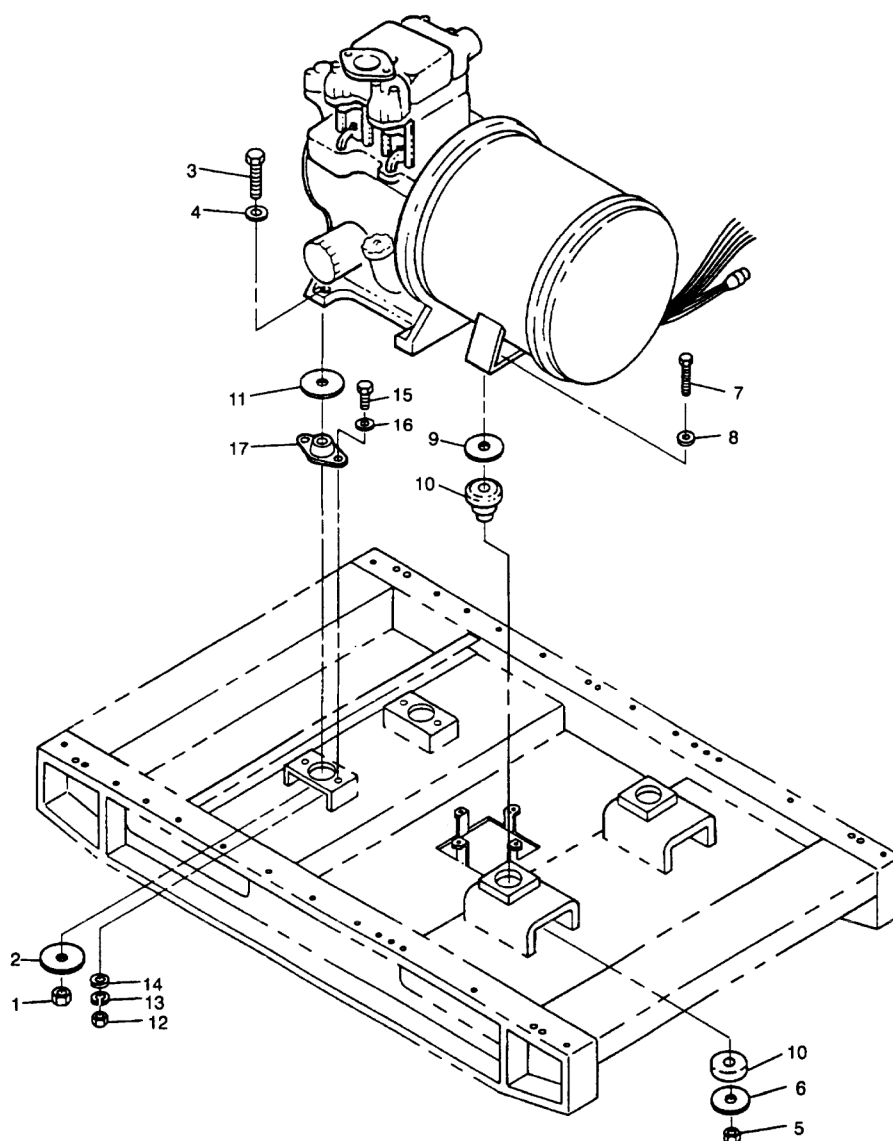


Figure 1. Engine and Generator Assembly Removal.

3. Install generator to engine (WP 0107, MEP-802A, Assembly/Installation) (WP 0108, MEP-812A, Installation).

WARNING

Rated capacity of overhead hoist should be at least 1,500 pounds (680 kg). Do not use a hoist with less capacity. Failure to comply with this warning can cause injury or death to personnel, and damage to equipment.

INSTALLATION – CONTINUED**NOTE**

If only the generator was removed, attach overhead lifting device to generator lift points only.

4. Attach a suitable lifting device to lifting points on engine and generator.

NOTE

If only the generator was removed, proceed to Step 7.

5. Lift engine and generator assembly, move and position assembly on skid base mating engine and generator mounting brackets with mounts on skid base.
6. Install nuts (Figure 1, Item 1), washers (Figure 1, Items 2 and 4), and mounting bolts (Figure 1, Item 3) at engine mounts. Torque nuts (Figure 1, Item 1) to 31 ft•lbs (42 N•m). Proceed to Step 9.
7. Lift generator and remove wooden shims used to support rear of engine.
8. Tighten nuts (Figure 1, Item 1) at engine mounting points to 31 ft•lbs (42 N•m).
9. i. Install nuts (Figure 1, Item 5), washers (Figure 1, Items 6 and 8), and mounting bolts (Figure 1, Item 7) at generator mounting points. Torque nuts (Figure 1, Item 5) to 45 ft•lbs (61 N•m).

NOTE

If only the generator was removed, proceed to Step 11.

10. Remove cap and connect fuel return line at Number 2 injector (TM 9-2815-252-24).

CAUTION

Wires running the length of the generator set on the left side have not been disconnected. Use care when lifting the rear generator set housing to avoid cutting or pulling these wires.

11. Using a suitable lifting device or an assistant, lift and rotate rear generator set housing assembly to right and lower onto skid base.
12. From left side of generator set, perform following installation procedures:
 - a. Connect electrical connections to low oil pressure switch (WP 0092, Figure 1, Item 1) and oil pressure sender (WP 0092, Figure 1, Item 2). Remove tags.
 - b. Connect oil pressure line (WP 0092, Figure 1, Item 3) to fitting (WP 0092, Figure 1, Item 24) on engine block.
 - c. Connect fuel filter/water separator drain hose (WP 0087, Figure 1, Item 10) to fuel filter/water separator drain valve.
 - d. Remove cap and install fuel supply hose (WP 0087, Figure 1, Item 9) at fuel filter/water separator fitting (WP 0087, Figure 1, Item 18).
 - e. Remove caps and install fuel supply line (WP 0087, Figure 1, Item 2).
 - f. Connect frequency control cable (WP 0091, Figure 1, Item 6) to mechanical governor.

NOTE

If only the generator was removed, proceed to sub-step h.

- g. Connect oil drain hose (WP 0090, Figure 1, Item 4) to fitting (WP 0090, Figure 1, Item 8) and tighten clamp (WP 0090, Figure 1, Item 3).
- h. Install upper radiator hose (WP 0072, Figure 1, Item 20) and lower radiator hose (WP 0072, Figure 1, Item 22) with clamps (WP 0072, Figure 1, Items 19 and 21) as tagged during removal. Remove tags.

INSTALLATION – CONTINUED

- i. Install nut (WP 0091, Figure 1, Item 14), bolt (WP 0091, Figure 1, Item 12), and clamp (WP 0091, Figure 1, Item 15) to fuel solenoid bracket (WP 0091, Figure 1, Item 16).
 - j. Connect electrical leads to coolant temperature sender (WP 0092, Figure 1, Item 4) and coolant high temperature switch (WP 0092, Figure 1, Item 5). Remove tags.
 - k. Connect electrical leads to fuel solenoid (WP 0092, Figure 1, Item 17). Remove tags.
- 13. Install bolts (WP 0018, Figure 1, Item 12), nuts (WP 0018, Figure 1, Item 13), new lock washers (WP 0018, Figure 1, Item 14), and washers (WP 0018, Figure 1, Item 15) securing lifting ring brackets (WP 0018, Figure 1, Item 16) and lifting rings (WP 0018, Figure 1, Item 17) to skid base (both sides).
 - 14. Install nuts (WP 0018, Figure 1, Item 58), new lock washers (WP 0018, Figure 1, Item 59), washers (WP 0018, Figure 1, Item 60), and bolts (WP 0018, Figure 1, Item 61) securing center housing panel (WP 0018, Figure 1, Item 62) to skid base.
 - 15. Install bolts (WP 0018, Figure 1, Item 20), new lock washers (WP 0018, Figure 1, Item 21), and washers (WP 0018, Figure 1, Item 22) securing rear side housing panels (WP 0018, Figure 1, Items 23 and 24) to skid base.
 - 16. Install bolts (WP 0015, Figure 1, Item 80) and nuts (WP 0015, Figure 1, Item 81) securing door sills (WP 0015, Figure 1, Items 82 and 83) to center housing panel (WP 0018, Figure 1, Item 62).
 - 17. From right side of generator set, perform following installation procedures:
 - a. Install bolt (WP 0015, Figure 1, Item 70), nut (WP 0015, Figure 1, Item 71), new lock washer (WP 0015, Figure 1, Item 72), washer (WP 0015, Figure 1, Item 73), mounting plate (WP 0015, Figure 1, Item 74), and grounding rods (WP 0015, Figure 1, Item 75).
 - b. Connect coolant drain hose (WP 0072, Figure 1, Item 35) at engine block drain valve.
 - c. Connect electrical connections to heater plugs (TM 9-2815-252-24). Remove tags.
 - d. Connect electrical connections to alternator (WP 0012, Figure 1, Item 9). Remove tags.
 - e. Install starter (TM 9-2815-252-24).
 - f. Connect electrical connections to magnetic pickup (WP 0091, Figure 1, Item 7). Remove tags.
 - g. Connect four pin connector J5 under control box.

NOTE

If only the generator was removed, proceed to Step 19.

- 18. Install muffler (WP 0067, Installation).
- 19. Install hose (WP 0064, Figure 1, Item 3) between air cleaner (WP 0064, Figure 1, Item 7) and air intake manifold. Tighten two clamps (WP 0064, Figure 1, Item 2).

NOTE

If only the generator was removed, proceed to Step 22.

NOTE

Fan shroud is in two pieces.

- 20. Install bolts (WP 0072, Figure 1, Item 13), nuts (WP 0072, Figure 1, Item 14), and fan shroud (WP 0072, Figure 1, Item 15).
- 21. Install bolts (WP 0015, Figure 1, Item 18), new lock washers (WP 0015, Figure 1, Item 19), washers (WP 0015, Figure 1, Item 20), bolts (WP 0015, Figure 1, Item 21), nuts (WP 0015, Figure 1, Item 22), and air deflector panels (WP 0015, Figure 1, Items 23, 24, and 25) to front housing (WP 0015, Figure 1, Item 56).

INSTALLATION – CONTINUED

22. Install bolts (WP 0018, Figure 1, Item 7), nuts (WP 0018, Figure 1, Item 8), new lock washers (WP 0018, Figure 1, Item 9), and washers (WP 0018, Figure 1, Item 10) securing lower door sill (WP 0018, Figure 1, Item 11) to skid base.
23. Install nut (WP 0018, Figure 1, Item 5) and bolt (WP 0018, Figure 1, Item 4) securing center door post (WP 0018, Figure 1, Item 6) to skid base.
24. Install nuts (WP 0101, Figure 1, Item 1), new lock washers (WP 0101, Figure 1, Item 2), washers (WP 0101, Figure 1, Item 3), and bolts (WP 0101, Figure 1, Item 4) securing load output terminal board assembly (WP 0101, Figure 1, Item 13) to skid base.
25. Connect wires at terminal board TB3 (WP 0058, Figure 1, Item 16) leading from generator. Remove tags.
26. Install top housing panel (WP 0015, Installation).
27. Install control box top panel (WP 0014, Installation).

NOTE

If only the generator was removed, proceed to Step 30.

28. Service coolant system (WP 0006, Radiator).
29. Service engine lubrication system (WP 0006, Lubricating Oil).
30. Install screws (WP 0072, Figure 1, Item 2), washers (WP 0072, Figure 1, Item 3), and fan guards (WP 0072, Figure 1, Item 4).
31. Install batteries (WP 0010, Installation).

NOTE

If only the generator was removed, proceed to Step 33.

32. Prime and bleed engine fuel system (TM 9-2815-252-24).
33. Start generator set and check for proper operation of all components.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**REMOVAL AND INSTALLATION OF MAJOR COMPONENTS, ENGINE REPLACEMENT: REPLACEMENT**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Suitable Lifting Device

Personnel Required

91D (1)

Assistant (1)

References

Battery Charging Alternator (WP 0012)

Radiator (WP 0072)

Cooling Fan (WP 0076)

Fan Belt (WP 0077)

References - cont'd

Oil Drain Line (WP 0090)

Low Oil Pressure Switch (WP 0092)

Coolant Temperature Sender (WP 0094)

Coolant High Temperature Switch (WP 0095)

Magnetic Pickup (WP 0096)

Fuel Solenoid (WP 0097)

Engine and Generator Assembly (WP 0104)

Adjusting Frequency Droop at Engine Governor (WP 0099)

Generator Assembly (MEP-802A) (WP 0107)

Generator Assembly (MEP-812A) (WP 0108)

Equipment Condition

Engine Control Switch OFF/RESET

Battery Disconnect Switch OFF

Dead Crank Switch OFF

REPLACEMENT**WARNING**

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

Slave receptacle (NATO connector) is electrically live at all times and is unfused. The Battery Disconnect Switch does not remove power from the slave receptacle. NATO slave receptacle has 24 VDC even when Battery Disconnect Switch is set to OFF. This circuit is only dead

REPLACEMENT – CONTINUED

when the batteries are fully disconnected. Disconnect the batteries before performing maintenance on the slave receptacle. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

Each battery weighs more than 70 pounds (32 kg) and requires a two-person lift. Lifting batteries can cause back strain. Ensure proper lifting techniques are used when lifting batteries. Failure to comply with this warning can cause injury to personnel.

WARNING

Support components when removing attaching hardware or component may fall. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

1. Remove engine and generator assembly from generator set (WP 0104, Removal).
2. Remove generator from engine (WP 0107, Removal/Disassembly (MEP-802A)/WP 0108, Removal (MEP-812A)).
3. Drill existing lower alternator mounting hole on new engine to 0.510 in (12.9 mm)
4. Drill a 0.21 in (5.33 mm) hole in top web of oil filler cap of new engine.
5. Remove the following from the old engine and install on new engine:
 - a. Fan belt (WP 0077).

REPLACEMENT – CONTINUED

- b. Cooling fan (WP 0076).
 - c. Battery charging alternator (WP 0012). Use hardware and support bracket from old engine.
 - d. Fuel solenoid with oil cap chain (WP 0097). Use hardware from old engine.
 - e. Magnetic pickup (WP 0096).
 - f. Oil drain hose elbow (WP 0090, Figure 1, Item 7) and fitting (WP 0090, Figure 1, Item 8).
 - g. Coolant high temperature switch (WP 0095).
 - h. Coolant temperature sender (WP 0094).
 - i. Engine block coolant drain valve (WP 0072, Figure 1, Item 36) and bushing (WP 0072, Figure 1, Item 37).
 - j. Engine oil pressure line elbow (WP 0092, Figure 1, Item 24).
 - k. Starter mounting bolts.
- 6. Connect chain from fuel solenoid bracket to oil filler cap at hole drilled in Step 4.
 - 7. Install generator on engine (WP 0107, Assembly/Installation (MEP-802A)/WP 0108, Installation (MEP-812A)).
 - 8. Install engine and generator assembly in generator set (WP 0104, Installation).
 - 9. Check and adjust fan belt as necessary (WP 0077, Adjustment).
 - 10. Check and adjust magnetic pickup as necessary (WP 0096, Adjustment).
 - 11. Check and adjust frequency droop as necessary (WP 0099).
 - 12. Start generator set; check for leaks and proper operation.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

MAINTENANCE OF GENERATOR ASSEMBLY, ADJUSTMENTS AND TESTS

INITIAL SETUP:

Test Equipment

Multimeter

References

Generator Assembly (MEP-802A) (WP 0107)

Generator Assembly (MEP-812A) (WP 0108)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Generator Shutdown as required

Engine Cool

Personnel Required

91D (1)

Assistant (1)

GENERAL

All of the following adjustments and tests can be performed without disassembly of the generator. They should be used for testing generator and regulator components to ensure proper operation.

Residual Magnetism.

Residual magnetism is automatically maintained in the generator exciter field poles by the generator set electrical control system. Therefore, there will be no requirement to restore the residual magnetism.

Table 1. Generator Resistance Values at 25 °C (77 °F).

COMPONENT	RESISTANCE	
	MEP-802A	MEP-812A
Exciter Stator Leads	10.54 to 14.26 ohms	10.500 to 14.206 ohms
Exciter Rotor Leads	0.4926 to 0.6664 ohms	0.4889 to 0.6613 ohms
Generator Rotor Leads	2.46 to 3.33 ohms	1.553 to 2.101 ohms
Generator Stator Leads	0.3731 to 0.5047 ohms	0.1494 to 0.2022 ohms
Q ₁ and Q ₂ Leads	0.9053 to 1.224 ohms	1.207 to 1.663 ohms

NOTE

Ambient temperature must be expressed in °C. To convert °C to °F, use: °F = °C x 9/5 + 32.

To determine the resistance values at current ambient temperature, use the following formula:

$$R_1 = R_{25} [1 + 0.00385 (T - 25)]$$

R₁ = Unknown resistance

R₂₅ = Known resistance at 25 °C (77 °F)

T = Current ambient temperature

GENERAL – CONTINUED

Example for exciter stator leads at 5 °C (41 °F):

$$R_1 = 12.4 [1 + 0.00385 (5-25)]$$

$$R_1 = 12.4 [1 + 0.00385 (-20)]$$

$$R_1 = 12.4 [1 + (-0.077)]$$

$$R_1 = 12.4 [0.923]$$

$$R_1 = 11.4 \pm 15\% \text{ ohms}$$

TESTING ROTATING RECTIFIERS

Two rectifier assemblies (F1+ and F2-) make up the rotating rectifier bridge assembly (Figure 1). Set multimeter for ohms and test each rectifier (CR) using negative and positive polarities. Test rectifiers as follows:

1. Shutdown generator set. Allow generator to cool to ambient temperature.
2. Open left side engine access door and disconnect negative battery cable.
3. Open storage box access door and output terminal board access door.
4. Remove end bell cover from generator (WP 0107, Removal/Disassembly Step 5 (MEP-802A) or WP 0108, Disassembly Step 8 (MEP-812A).

NOTE

The following steps will require turning the generator by hand. Use engine fan to turn engine and generator.

5. Tag and disconnect four leads from F1+ assembly

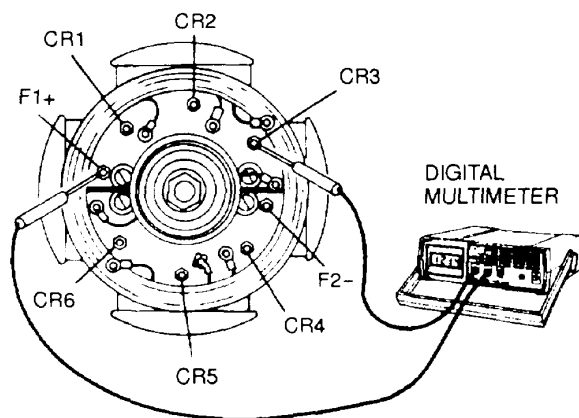


Figure 1. Testing Rotating Rectifiers.

6. Connect positive lead of multimeter to F1+ stud and negative lead to CR1. Record resistance value.
7. Connect negative lead of multimeter to F1+ stud and positive lead to CR1. Record resistance value.
8. Repeat Steps 6 and 7 for CR2 and CR3.

TESTING ROTATING RECTIFIERS – CONTINUED

9. Resistance readings should be high in Step 6 and low in Step 7. If any reading is high or low in both steps, rectifier assembly is defective and must be replaced.
10. Connect all leads to F1+ assembly and tighten nuts to 24 in•lbs (2.7 N•m). Remove tags.
11. Tag and disconnect four leads from F2- assembly.
12. Connect negative lead of multimeter to F2- stud and positive lead to CR4. Record resistance value.
13. Connect positive lead of multimeter to F2- stud and negative lead to CR4. Record resistance value.
14. Repeat Step 12 and Step 13 for CR5 and CR6.
15. Resistance readings should be low in Step 12 and high in Step 13. If any reading is high or low in both tests, rectifier assembly is defective and must be replaced.
16. Reconnect all leads to F2- assembly and tighten nuts to 24 in•lbs (2.7 N•m). Remove tags.
17. Install end bell cover on generator (WP 0107, Assembly/Installation Step 14 (MEP-802A) or WP 0108, Assembly Step 7 (MEP-812A)).
18. Connect negative battery cable and close access doors.

Testing Brushless Exciter Stator

Using multimeter set for ohms, test the brushless exciter stator (Figure 2) for open or shorted windings and grounds as follows:

NOTE

Tests are performed with component installed.

1. Shutdown generator set. Allow generator to cool to ambient temperature.

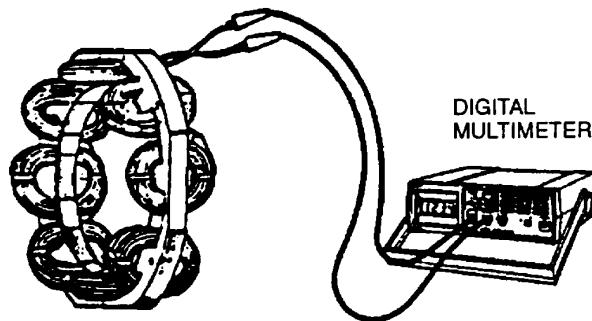


Figure 2. Testing Exciter Field.

2. Open left side engine access door and disconnect negative battery cable.
3. Open storage box and output terminal board access doors.
4. Remove end bell cover from generator (WP 0107, Removal/Disassembly Step 5 (MEP-802A) or WP 0108, Step 8 (MEP-812A)).
5. Disconnect F1+ and F2- exciter stator leads from terminal block (WP 0107, Figure 2, Item 13 or WP 0108, Figure 1, Item 36) in generator end bell. Set multimeter for ohms and connect between disconnected leads. The resistance between leads should be as shown in Table 1.
6. Readings other than shown in Table 1 indicate open or shorted windings and exciter stator must be replaced.

TESTING ROTATING RECTIFIERS – CONTINUED

7. Connect multimeter between each exciter stator field lead and exciter stator lamination. Multimeter reading of less than infinity indicates defective ground insulation and exciter stator must be replaced.
8. Connect F1+ and F2- exciter stator leads to terminal block in generator end bell.
9. Install end bell cover on generator (WP 0107, Assembly/Installation Step 14 (MEP-802A) or WP 0108, Assembly Step 7 (MEP-812A)).
10. Connect negative battery cable and close access doors.

Testing Brushless Exciter Rotor (Armature)

Using resistance bridge and multimeter set for ohms, test the brushless exciter rotor (Figure 1) for open or shorted windings and grounds as follows:

1. Shutdown generator set. Allow generator to cool to ambient temperature.
2. Open left side engine access door and disconnect negative battery cable.
3. Open storage box and output terminal board access doors.
4. Remove end bell cover from generator (WP 0107, Removal/Disassembly Step 5 (MEP-802A) or WP 0108 Step 8 (MEP-812A)).
5. Tag and disconnect lead wires from diodes CR1, CR2, CR3, CR4, CR5, and CR6 on rotating rectifier.
6. Connect resistance bridge between leads CR1 and CR2, CR2 and CR3, CR1 and CR3, CR4 and CR5, CR4 and CR6, and CR5 and CR6. Resistance between leads should be as shown in Table 1.

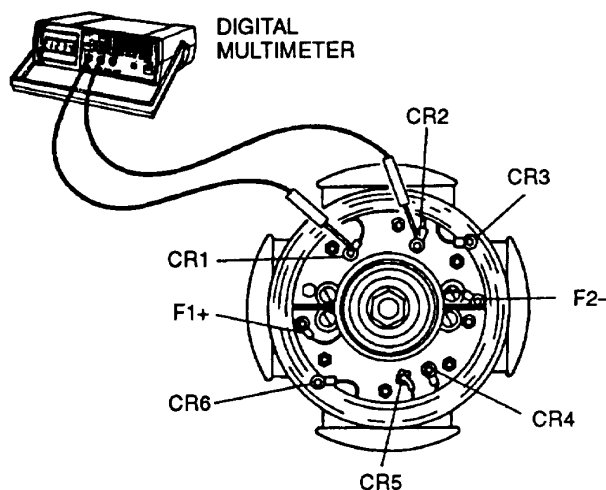


Figure 3. Testing Exciter Armature.

7. Readings other than shown in Table 1 indicate open or shorted windings and exciter rotor must be replaced.
8. Connect leads of multimeter between each CR lead and exciter rotor lamination. Multimeter reading less than infinity indicates defective ground insulation and exciter rotor must be replaced.
9. Connect exciter rotor lead wires to diodes CR1, CR2, CR3, CR4, CR5, and CR6. Tighten nuts to 24 in•lbs (2.7 N•m) and remove tags.
10. Install end bell cover on generator (WP 0107, Assembly/Installation Step 14 (MEP-802A) or WP 0108, Assembly Step 7 (MEP-812A)).

TESTING ROTATING RECTIFIERS – CONTINUED

11. Connect negative battery cable and close access doors.

Testing Generator Rotor

Using multimeter set for ohms, test the generator rotor for open or shorted windings (Figure 4) and grounds (Figure 5) as follows:

1. Shutdown generator set. Allow generator to cool to ambient temperature.
2. Open left side engine access door and disconnect negative battery cable.
3. Open storage box and output terminal board access doors.
4. Remove end bell cover from generator (WP 0107, Removal/Disassembly Step 5 (MEP-802A) or WP 0108, Removal/Disassembly Step 8 (MEP-812A).
5. Disconnect rotor leads F1+ and F2- from rotating rectifier assemblies.
6. Connect multimeter between F1+ and F2- leads (Figure 4). Resistance reading should be as shown in Table 1.
7. If resistance is low, there are shorted windings. If resistance is high, rotor winding is open. In either case, rotor must be replaced.

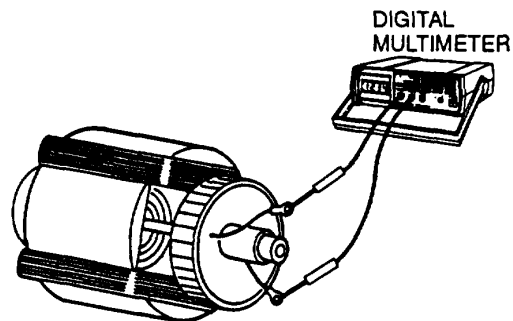


Figure 4. Testing Rotor for Open or Shorted Windings.

8. Connect multimeter leads between F1+ and rotor shaft and between F2- and rotor shaft in turn (Figure 5). Multimeter should not register.

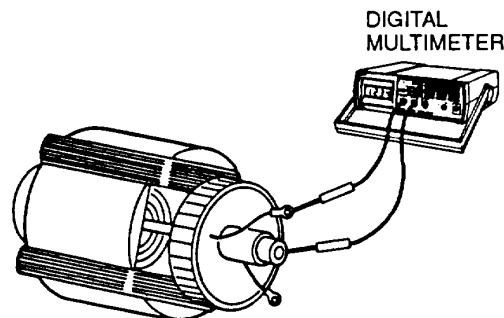


Figure 5. Testing Rotor for Grounds.

9. If multimeter registers, rotor is grounded and must be replaced.

TESTING ROTATING RECTIFIERS – CONTINUED

10. Connect F1+ and F2- leads to rotating rectifier assemblies. Tighten nuts to 24 in•lbs (2.7 N•m).
11. Install end bell cover on generator (WP 0107, Assembly/Installation Step 14 (MEP-802A) or WP 0108, Assembly Step 7 (MEP-812A)).
12. Connect negative battery cable and close access doors.

Testing Generator Stator

Using resistance bridge and multimeter set for ohms, test the generator stator (Figure 6) for open or shorted windings and grounds as follows:

1. Shutdown generator set. Allow generator to cool to ambient temperature.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove control box top panel (WP 0014, Removal).
4. Tag and disconnect twelve main generator coil leads from TB3 in output box.
5. Tag and disconnect Q1 and Q2 leads from terminals 7 and 8 of AC voltage regulator.
6. Open storage box and output terminal board access doors.
7. Connect resistance bridge between coil leads (Figure 6). All readings should be as shown for generator stator leads in Table 1.

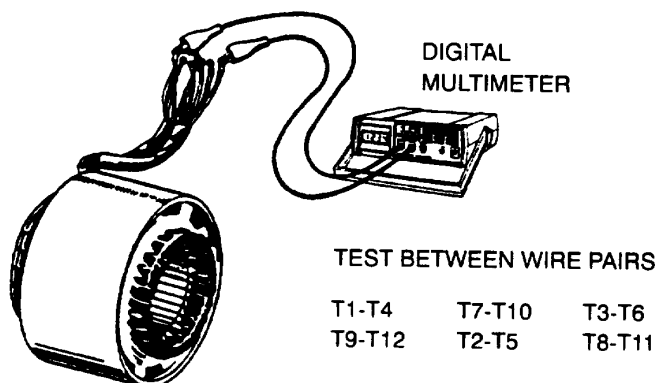


Figure 6. Testing Stator Windings.

8. Connect resistance bridge between leads Q1 and Q2. Reading should be as shown in Table 1.

NOTE

Before replacing stator assembly, check leads for broken wires or insulation. Repair or replace as necessary.

9. If resistance is low, there are shorted windings. If resistance is high, stator winding is open. In either case, stator must be replaced.
10. Connect multimeter between generator housing and generator set ground. Multimeter should register.
11. Connect multimeter between each coil lead and generator housing, in turn. Multimeter should not register.
12. If multimeter registers on any reading, stator windings are grounded and stator assembly must be replaced.
13. Connect Q1 and Q2 leads to terminals 7 and 8 of AC voltage regulator and remove tags.

TESTING ROTATING RECTIFIERS – CONTINUED

14. Connect main generator coil leads to TB3 and remove tags.
15. Install control box top panel (WP 0014, Installation).
16. Connect negative battery cable and close access doors.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF GENERATOR ASSEMBLY, GENERATOR ASSEMBLY (MEP-802A):
REMOVAL AND DISASSEMBLY, INSPECTION, REPAIR, ASSEMBLY AND INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Additional Protective Clothing
New Lockwashers
Overhead hoist (at least 1,500 lbs rated capacity) (
New ring gear
Wooden wedges
Grease (WP 0150, Table 1, Item 10)

Personnel Required

91D (1)
Assistanct (1)

References

Rear Housing Section (WP 0018)
Front Housing Panel (WP 0104)
Expendable and Durable Items List (WP 0150)

Equipment Condition

Generator Shutdown as required
Engine Control Switch OFF/RESET
Battery Disconnect Switch OFF
Dead Crank Switch OFF
Properly Grounded Before Starting

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL AND DISASSEMBLY**WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove generator set rear housing section (WP 0018, Removal).
4. Remove generator mounting hardware (WP 0104, Removal, Step 26).
5. Insert wooden wedges between rear end of engine and skid base to support engine when generator is removed.
6. Remove bolts (Figure 2, Item 1) and end bell cover (Figure 2, Item 2).
7. Remove nuts (Figure 2, Item 3), washers (Figure 2, Item 4), and end bell (Figure 2, Item 5).
8. Tag and disconnect exciter stator leads (Figure 2, Item 6) and AC voltage regulator leads (Figure 2, Item 7) from terminal block (Figure 2, Item 13) in end bell (Figure 2, Item 5).
9. Remove bolts (Figure 2, Item 8), washers (Figure 2, Item 9), brushless exciter stator (Figure 2, Item 10), and packing (Figure 2, Item 11) from end bell (Figure 2, Item 5).
10. Remove bolts (Figure 2, Item 12) and terminal board (Figure 2, Item 13) from end bell (Figure 2, Item 5).

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL AND DISASSEMBLY – CONTINUED**WARNING**

Rated capacity of overhead hoist should be at least 1,500 pounds (680 kg). Do not use a hoist with less capacity. Failure to comply with this warning can cause injury or death to personnel, and damage to equipment.

WARNING

Keep hands and feet from underside of engine and generator while using lifting device to remove them from the skid base. Failure to comply with this warning can cause injury or death to personnel.

CAUTION

Use care to avoid contact between stator (Figure 2, Item 14) and rotor assembly (Figure 2, Item 16).

11. Attach lifting harness to overhead hoist and generator lifting eye and take up slack.
12. Using lifting device attached to stator (Figure 2, Item 14) lifting point, carefully pry loose (screwdriver slots provided), and remove stator (Figure 2, Item 14) from engine/generator adapter (Figure 2, Item 15).
13. Use rope sling to support rotor (Figure 2, Item 16), refer to Figure 1.

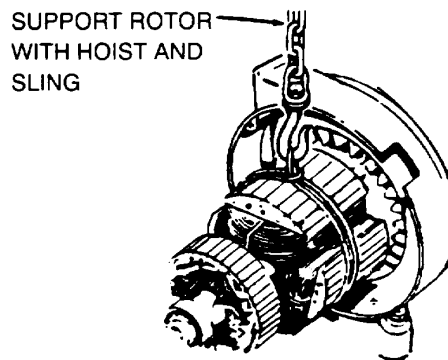


Figure 1. Support of Rotor Assembly.

NOTE

Use securing device to keep flywheel/generator fan (Figure 2, Item 20) from turning.

14. Remove bolts (Figure 2, Item 17), washers (Figure 2, Item 18), lock washers (Figure 2, Item 19), and rotor assembly (Figure 2, Item 16) from engine flywheel/generator fan (Figure 2, Item 20). Discard lockwashers (Figure 2, Item 19).
15. Remove bolts (Figure 2, Item 22), washers (Figure 2, Item 23), lock washers (Figure 2, Item 24), and drive disc (Figure 2, Item 25) from rotor assembly (Figure 2, Item 16). Discard lockwashers (Figure 2, Item 24).
16. Using gear puller, remove bearing (Figure 2, Item 26) from rotor assembly (Figure 2, Item 16).
17. Tag and disconnect F1+ and F2- leads (Figure 2, Item 29) from rotating rectifiers by removing nuts (Figure 2, Item 27) and washers (Figure 2, Item 28).
18. Using gear puller, carefully remove exciter rotor (Figure 2, Item 30) from rotor assembly (Figure 2, Item 16).
19. Remove thru-bolts (Figure 2, Item 31) from engine/generator adapter (Figure 2, Item 15).

REMOVAL AND DISASSEMBLY – CONTINUED

20. Remove bolts (Figure 2, Item 32) and engine flywheel/generator fan (Figure 2, Item 20) from engine crankshaft.

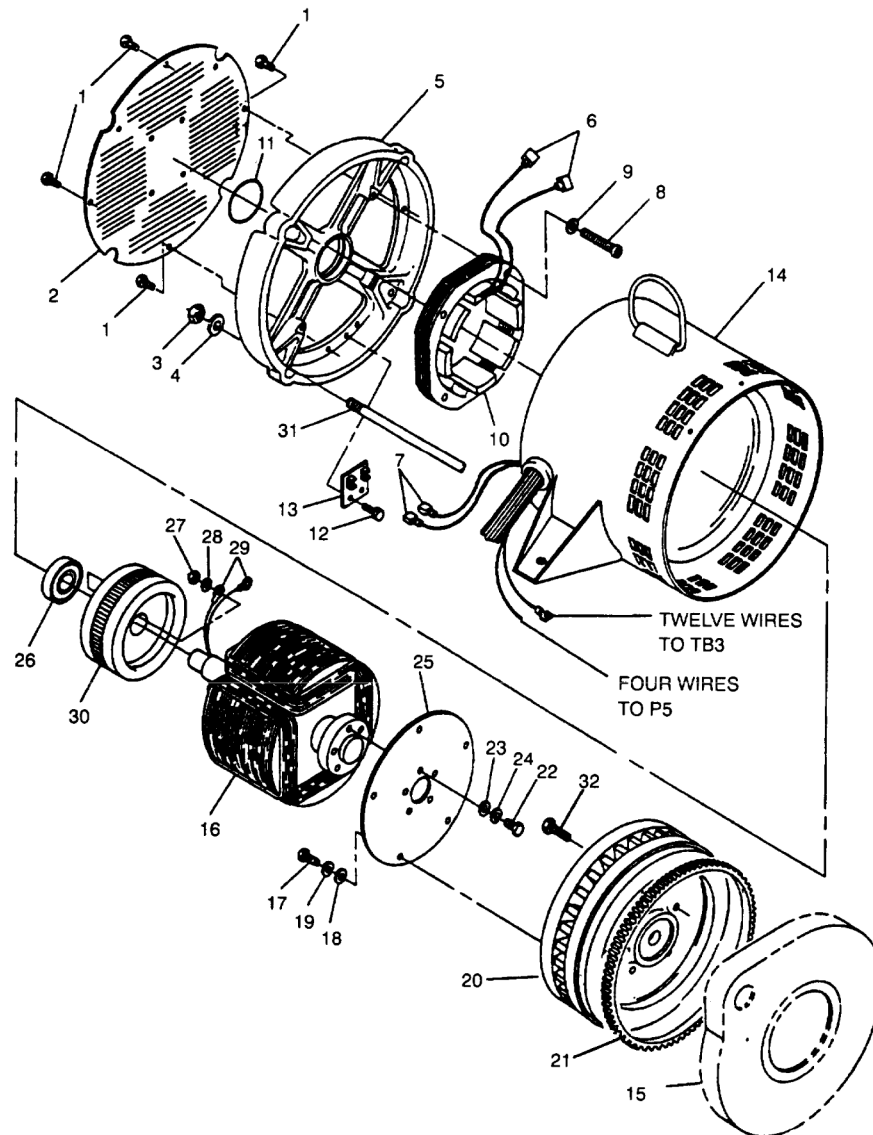


Figure 2. Generator Assembly (MEP-802A).

END OF TASK**INSPECTION**

1. Inspect end bell assembly (Figure 2, Item 5) for cracks, torn packing (Figure 2, Item 11), broken terminal board (Figure 2, Item 13), and other damage.
2. Inspect exciter stator (Figure 2, Item 10) for broken windings, evidence of overheating, damaged insulation, and loose terminal ends.

INSPECTION – CONTINUED

3. Inspect bearing (Figure 2, Item 26) for looseness and evidence of overheating.
4. Inspect exciter rotor (Figure 2, Item 30) for broken windings, evidence of overheating, damaged insulation, and other damage.
5. Inspect rotor assembly (Figure 2, Item 16) for broken windings, evidence of overheating, damaged insulation, and loose terminal ends.
6. Inspect stator (Figure 2, Item 14) for broken windings, evidence of overheating, damaged insulation, loose terminal ends, and damaged housing.
7. Inspect drive disc (Figure 2, Item 25) for bends, cracks, elongated mounting holes, and other damage.
8. Inspect flywheel/generator fan (Figure 2, Item 20) for cracks, bent or broken fan blades, broken teeth, stripped threads, and other damage.

END OF TASK**REPAIR**

Repair generator assembly by replacing damaged components.

1. If ring gear (Figure 2, Item 21) is damaged, place the flywheel/generator fan (Figure 2, Item 20) on a solid flat surface.
2. Drive ring gear (Figure 2, Item 21) off with a brass drift and hammer.

WARNING

Oil fumes or oil can ignite above 380 °F (193 °C). Use a thermometer and do not exceed 360 °F (182 °C). Do not allow a flame or heating element to be in direct contact with oil. Heat oil in a well ventilated area. Plan a safe handling procedure to avoid burns. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

CAUTION

If flame heat is used, be sure gear is heated uniformly around circumference. Do not overheat. Overheating may also destroy original heat treatment of gear.

3. Heat new ring gear (Figure 2, Item 21) to 300 °F (148 °C) using either heated oil, oven heat, or flame heat.
4. Turn gear so side with chamfer is toward engine with flywheel installed.
5. Install ring gear (Figure 2, Item 21) against shoulder of flywheel.

END OF TASK**ASSEMBLY AND INSTALLATION**

1. Clean and inspect all mating surfaces.
2. Coat mating area between bearing (Figure 2, Item 26) and end bell (Figure 2, Item 5) with grease (WP 0150, Item 10).

ASSEMBLY AND INSTALLATION – CONTINUED

3. Install engine flywheel/generator fan (Figure 2, Item 20) on engine crankshaft with bolts (Figure 2, Item 32). Torque bolts (Figure 2, Item 32) to 51 ft•lbs (69 N•m).
4. Install thru-bolts (Figure 2, Item 31) in adapter (Figure 2, Item 15).
5. Press exciter rotor (Figure 2, Item 30) on rotor assembly (Figure 2, Item 16) to shoulder of shaft. Connect F1+ and F2- leads (Figure 2, Item 29) on rotating rectifiers with nuts (Figure 2, Item 27) and washers (Figure 2, Item 28), and remove tags. Torque nuts (Figure 2, Item 27) to 24 in•lbs (32 N•m).
6. Press bearing (Figure 2, Item 26) onto shaft of rotor assembly (Figure 2, Item 16).
7. Install drive disc (Figure 2, Item 25) on rotor assembly (Figure 2, Item 16) with new lock washers (Figure 2, Item 24), washers (Figure 2, Item 23), and bolts (Figure 2, Item 22). Torque bolts (Figure 2, Item 22) 48 to 53 ft•lbs (65 to 72 N•m).

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Rated capacity of overhead hoist should be at least 1,500 pounds (680 kg). Do not use a hoist with less capacity. Failure to comply with this warning can cause injury or death to personnel, and damage to equipment.

WARNING

Keep hands and feet from underside of engine and generator while using lifting device to remove them from the skid base. Failure to comply with this warning can cause injury or death to personnel.

8. Attach lifting harness to overhead hoist and generator lifting eye.
9. Using rope sling and lifting device (Figure 1), install rotor assembly (Figure 2, Item 16) on engine flywheel/generator fan (Figure 2, Item 20) with new lock washers (Figure 2, Item 19), washers (Figure 2, Item 18), and bolts (Figure 2, Item 17). Torque bolts (Figure 2, Item 17) 19 to 21 ft•lbs (26 to 28 N•m).

CAUTION

Use care to avoid contact between stator (Figure 2, Item 14) and rotor assembly (Figure 2, Item 16).

10. Using lifting device, install stator (Figure 2, Item 14) into engine/generator adapter (Figure 2, Item 15).
11. Install packing (Figure 2, Item 11), bolts (Figure 2, Item 8), washers (Figure 2, Item 9), and brushless exciter stator (Figure 2, Item 10) on end bell (Figure 2, Item 5).
12. Install terminal board (Figure 2, Item 13) on end bell (Figure 2, Item 5) with bolts (Figure 2, Item 12).
13. Connect leads (Figure 2, Item 6) of brushless exciter stator (Figure 2, Item 10) and AC voltage regulator leads (Figure 2, Item 7) to terminal block (Figure 2, Item 13) in end bell (Figure 2, Item 5) and remove tags.
14. Install end bell (Figure 2, Item 5) with washers (Figure 2, Item 4) and nuts (Figure 2, Item 3). Torque nuts (Figure 2, Item 3) 19 to 21 ft•lbs (26 to 28 N•m).

ASSEMBLY AND INSTALLATION – CONTINUED

15. Install end bell cover (Figure 2, Item 2) with bolts (Figure 2, Item 1).
16. Install generator mounting hardware (WP 0104, Installation Step 9).
17. Remove wooden wedges between engine and skid base.
18. Install generator set rear housing section (WP 0018, Installation).
19. Connect negative battery cable and close left side engine access door.
20. Start generator set and check for proper operation.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE OF GENERATOR ASSEMBLY, GENERATOR ASSEMBLY (MEP-812A):
REMOVAL, DISASSEMBLY, INSPECTION, REPAIR, ASSEMBLY, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Additional Protective Clothing
New Lockwashers
Overhead hoist (at least 1,000 lbs rated capacity)
New ring gear
Wooden wedges
Grease (WP 0150, Table 1, Item 10)

Personnel Required

91D (1)
Assistant (1)

References

Rear Housing Section (WP 0018)
Front Housing Panel (WP 0104)
Expendable and Durable Items List (WP 0150)

Equipment Condition

Generator Shutdown as required
Engine Control Switch OFF/RESET
Battery Disconnect Switch OFF
Dead Crank Switch OFF
Properly Grounded Before Starting

WARNING

High voltage is produced when the generator set is in operation. Never attempt to start the generator set unless it is properly grounded. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure generator set is completely shutdown and free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Dangerous voltage exists on live circuits. Always observe precautions and never work alone. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Ensure that the engine cannot be started while maintenance is being performed (ENGINE CONTROL switch set to OFF/RESET; Battery Disconnect Switch is OFF; DEAD CRANK SWITCH is OFF). Failure to comply with this warning can cause injury or death to personnel.

WARNING

DC voltages are present at generator set electrical components even with generator set shut down. Avoid shorting any positive with ground/negative. Failure to comply with this warning can cause injury to personnel, and damage to equipment.

WARNING

The connection of any electrical equipment and the disconnection of any electrical equipment may cause an explosion hazard. Do not connect any electrical equipment or disconnect any electrical equipment in an explosive atmosphere. Failure to comply with this warning can cause injury or death to personnel.

WARNING

A qualified technician must make the power connections and perform all continuity checks. The power source may be a generator or commercial power. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when the generator set is in operation. DO NOT touch live voltage connections. Never attempt to connect or disconnect load cables or paralleling cables while the generator set is running. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL**WARNING**

When disconnecting or removing batteries, disconnect the negative lead that connects directly to the grounding stud first; disconnect the negative end of the interconnection cable next. When installing batteries, reverse the connection sequence. Failure to comply with this warning can cause injury to personnel.

1. Shutdown generator set.
2. Open left side engine access door and disconnect negative battery cable.
3. Remove generator set rear housing section (WP 0018, Removal).
4. Remove generator mounting hardware (WP 0104, Removal Step 26).
5. Insert wooden wedges between rear end of engine and skid base to support engine when generator is removed.
6. Remove bolt (Figure 1, Item 1), washer (Figure 1, Item 2), lockwasher (Figure 1, Item 3), and screen (Figure 1, Item 4) from generator frame/stator assembly (Figure 1, Item 5). Discard lockwasher (Figure 1, Item 3).

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Keep hands and feet from underside of engine and generator while using lifting device to remove them from the skid base. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**CAUTION**

Rated capacity of lifting device must be at least 1,000 lbs (454 kg).

7. Attach overhead lifting device to generator assembly lifting point. Take up slack to support weight of generator.

NOTE

The following step requires turning the generator by hand. Use engine fan to turn engine and generator.

8. Remove bolts (Figure 1, Item 6) and washers (Figure 1, Item 7) securing fan (Figure 1, Item 8) and drive plate (Figure 1, Item 9) to flywheel (Figure 1, Item 10).
9. Remove bolts (Figure 1, Item 11) and gently pry (screwdriver slots provided) generator assembly away from engine assembly.
10. Move generator assembly to maintenance work area. Support assembly to prevent damage.
11. Remove bolts (Figure 1, Item 12) and flywheel (Figure 1, Item 10) from engine crankshaft.

END OF TASK**DISASSEMBLY****WARNING**

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Keep hands and feet from underside of engine and generator while using lifting device to remove them from the skid base. Failure to comply with this warning can cause injury or death to personnel.

CAUTION

Rated capacity of lifting device must be at least 1,000 lbs (454 kg).

1. Using overhead lifting device, carefully lift and position generator assembly on work table with end bell (Figure 1, Item 31) resting on table.

DISASSEMBLY – CONTINUED

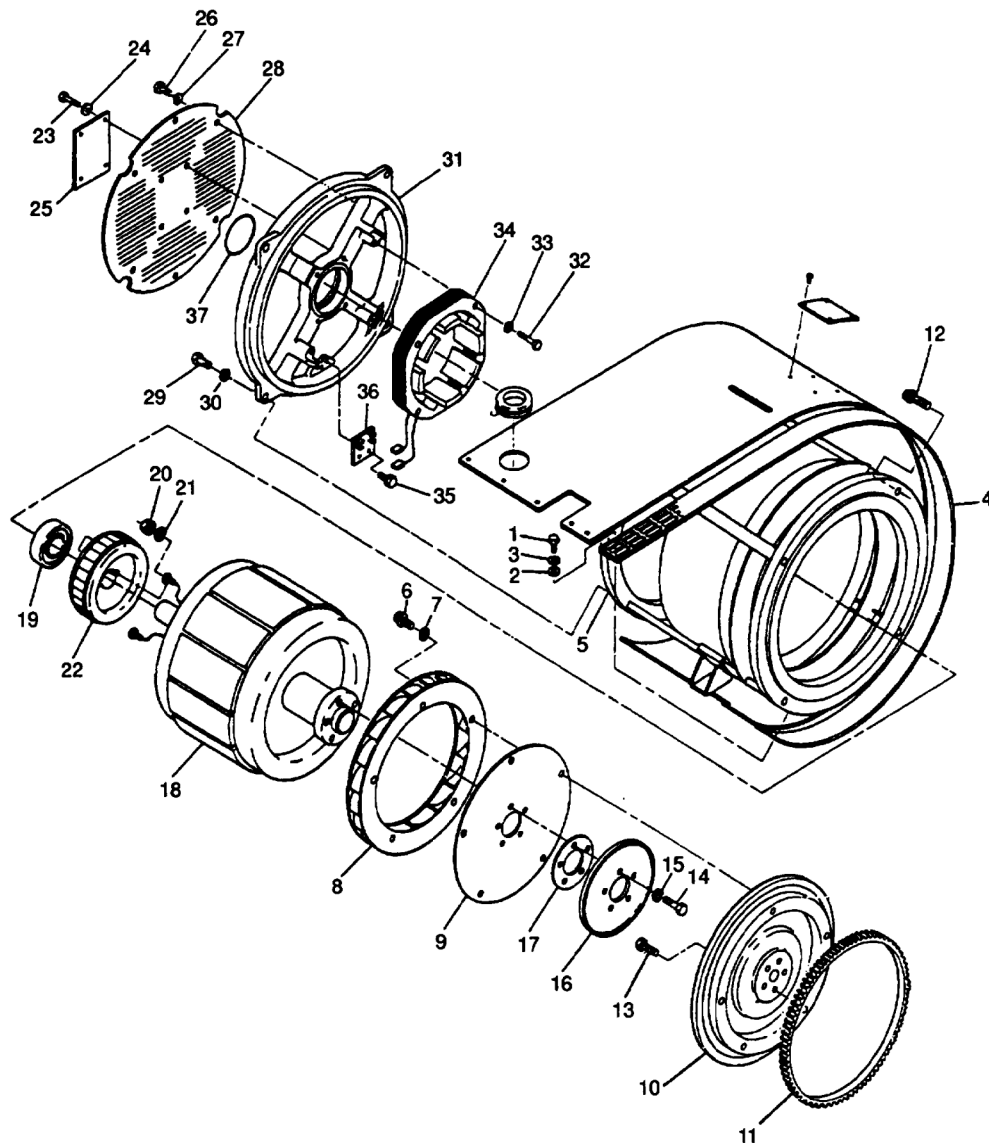


Figure 1. Generator Assembly (MEP-812A).

2. Remove bolts (Figure 1, Item 14), lock washers (Figure 1, Item 15), retention disk (Figure 1, Item 16), spacer (Figure 1, Item 17), drive plate (Figure 1, Item 9), and fan (Figure 1, Item 8) from rotor assembly (Figure 1, Item 18). Discard lockwashers (Figure 1, Item 15).

CAUTION

Use care to avoid contact between frame/stator assembly (Figure 1, Item 5) and rotor assembly (Figure 1, Item 18).

3. Attach overhead lifting device to rotor assembly (Figure 1, Item 18) and carefully lift rotor assembly (Figure 1, Item 18) out of frame/stator assembly (Figure 1, Item 5).
4. Using gear puller, remove bearing (Figure 1, Item 19) from rotor assembly (Figure 1, Item 18).

DISASSEMBLY – CONTINUED

5. Tag and disconnect FI+ and F2- leads from rotating rectifiers by removing nuts (Figure 1, Item 20) and washers (Figure 1, Item 21).
6. Using gear puller, carefully remove exciter rotor (Figure 1, Item 22) from rotor assembly (Figure 1, Item 18).
7. Using overhead lifting device, turn generator assembly over so that flywheel end is resting on table.
8. Remove bolts (Figure 1, Item 23), lock washers (Figure 1, Item 24), retention plate (Figure 1, Item 25), bolts (Figure 1, Item 26), lock washers (Figure 1, Item 27), and cover (Figure 1, Item 28) from end bell (Figure 1, Item 31). Discard lockwashers (Figure 1, Items 24 and 27).
9. Remove bolts (Figure 1, Item 29), washers (Figure 1, Item 30), and end bell (Figure 1, Item 31) from frame/stator assembly (Figure 1, Item 5).
10. Tag and disconnect exciter stator leads and AC voltage regulator leads from terminal block (Figure 1, Item 36).
11. Remove bolts (Figure 1, Item 32), lock washers (Figure 1, Item 33), and exciter stator (Figure 1, Item 34) from end bell (Figure 1, Item 31). Discard lockwashers (Figure 1, Item 33).
12. Remove bolts (Figure 1, Item 35), terminal block (Figure 1, Item 36), and packing (Figure 1, Item 37) from end bell (Figure 1, Item 31).

END OF TASK**INSPECTION**

1. Inspect end bell assembly (Figure 1, Item 31) for cracks, torn packing (Figure 1, Item 37), broken terminal board (Figure 1, Item 36), and other damage.
2. Inspect exciter stator (Figure 1, Item 34) for broken windings, evidence of overheating, damaged insulation, and loose terminal ends.
3. Inspect bearing (Figure 1, Item 19) for looseness and evidence of overheating.
4. Inspect exciter rotor (Figure 1, Item 22) for broken windings, evidence of overheating, damaged insulation, and other damage.
5. Inspect rotor assembly (Figure 1, Item 18) for broken windings, evidence of overheating, damaged insulation, and loose terminal ends.
6. Inspect frame/stator (Figure 1, Item 5) for broken windings, evidence of overheating, damaged insulation, loose terminal ends, and damaged housing.
7. Inspect drive plate (Figure 1, Item 9) and retention disk (Figure 1, Item 15) for bends, cracks, elongated mounting holes, and other damage.
8. Inspect flywheel (Figure 1, Item 10) for cracks, broken teeth, stripped threads, and other damage.
9. Inspect generator fan (Figure 1, Item 8) for cracks, bent or broken fan blades, and other damage.

END OF TASK**REPAIR**

Repair generator assembly by replacing damaged components.

1. If ring gear (Figure 1, Item 11) is damaged, place the flywheel (Figure 1, Item 10) on a solid flat surface.
2. Drive ring gear (Figure 1, Item 11) off with a brass drift and hammer.

REPAIR – CONTINUED**WARNING**

Oil fumes or oil can ignite above 380 °F (193 °C). Use a thermometer and do not exceed 360 °F (182 °C). Do not allow a flame or heating element to be in direct contact with oil. Heat oil in a well ventilated area. Plan a safe handling procedure to avoid burns. Failure to comply with this warning can cause severe burns and injury to personnel.

WARNING

Wear heat resistant gloves and avoid contacting hot metal surfaces with your hands after components have been heated. Wear additional protective clothing as required. Failure to comply with this warning can cause injury to personnel.

CAUTION

If flame heat is used, be sure gear is heated uniformly around circumference. Do not overheat. Overheating may also destroy original heat treatment of gear.

3. Heat new ring gear (Figure 1, Item 11) to 300 °F (148 °C) using either heated oil, oven heat, or flame heat.
4. Turn gear so side with chamfer is toward engine with flywheel installed.
5. Install ring gear (Figure 1, Item 11) against shoulder of flywheel.

END OF TASK**ASSEMBLY**

1. Clean and inspect all mating surfaces.
2. Coat mating area between bearing (Figure 1, Item 19) and end bell (Figure 1, Item 31) with grease (WP 0150, Item 10).
3. Install packing (Figure 1, Item 37), terminal block (Figure 1, Item 36), and bolts (Figure 1, Item 35) on end bell (Figure 1, Item 31).
4. Install exciter stator (Figure 1, Item 34) on end bell (Figure 1, Item 31) with new lock washers (Figure 1, Item 33) and bolts (Figure 1, Item 32).
5. Attach exciter stator leads and AC voltage regulator leads to terminal block (Figure 1, Item 36) and remove tags.
6. Install end bell (Figure 1, Item 31) on frame/stator assembly (Figure 1, Item 5) with washers (Figure 1, Item 30) and bolts (Figure 1, Item 29). Torque bolts (Figure 1, Item 29) 29 to 31 ft•lbs (39 to 42 N•m).
7. Install cover (Figure 1, Item 28) and retention plate (Figure 1, Item 25) on end bell (Figure 1, Item 31) with new lock washers (Figure 1, Items 24 and 27) and bolts (Figure 1, Items 23 and 26).

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

8. Using overhead lifting device, reposition generator assembly on work table with end bell (Figure 1, Item 31) resting on table.

ASSEMBLY – CONTINUED

9. Using arbor press, press exciter rotor (Figure 1, Item 22) on rotor assembly (Figure 1, Item 18) to shoulder of shaft. Connect F1+ and F2- leads on rotating rectifiers with washers (Figure 1, Item 20) and nuts (Figure 1, Item 19). Torque nuts (Figure 1, Item 20) 23 to 26 in•lbs (2.6 to 2.9 N•m). Remove tags.
10. Press bearing (Figure 1, Item 19) onto shaft of rotor assembly (Figure 1, Item 18).

CAUTION

Use care to avoid contact between frame/stator assembly (Figure 1, Item 5) and rotor assembly (Figure 1, Item 18).

11. Attach lifting device to rotor assembly (Figure 1, Item 18) and carefully lower rotor assembly (Figure 1, Item 18) into frame/stator assembly (Figure 1, Item 5). Ensure bearing (Figure 1, Item 19) enters bearing bore in end bell (Figure 1, Item 31).
12. Align mounting holes on fan (Figure 1, Item 8) and drive plate (Figure 1, Item 9), and wire together through two mounting holes.
13. Install fan (Figure 1, Item 8), drive plate (Figure 1, Item 9), spacer (Figure 1, Item 17), and retention disk (Figure 1, Item 16) on rotor assembly (Figure 1, Item 18) with new lock washers (Figure 1, Item 15) and bolts (Figure 1, Item 14). Torque bolts (Figure 1, Item 14) 29 to 31 ft•lbs (39 to 42 N•m).

END OF TASK**INSTALLATION**

1. Install flywheel (Figure 1, Item 10) to engine crankshaft with bolts (Figure 1, Item 13). Torque bolts (Figure 1, Item 13) 48 to 53 ft•lbs (65 to 72 N•m).

WARNING

Many components require a two-person lift. Lifting heavy components can cause back strain. Ensure proper lifting techniques are used when lifting heavy components. Failure to comply with this warning can cause injury to personnel.

WARNING

The generator set, engine, and generator are extremely heavy and require an assistant and a lifting device (forklift, overhead lifting device) with sufficient capacity. Failure to comply with this warning can cause injury or death to personnel.

CAUTION

Rated capacity of lifting device must be at least 1,000 lbs (454 kg).

2. Using overhead lifting device, carefully lift generator assembly and align with engine flywheel housing.
3. Install bolts (Figure 1, Item 12) and tighten alternately to draw generator assembly and engine assembly smoothly and evenly together. Torque bolts (Figure 1, Item 12) 19 to 21 ft•lbs (26 to 28 N•m).

NOTE

The following step requires turning the generator by hand. Use engine fan to turn engine and generator.

4. Align mounting holes and install bolts (Figure 1, Item 6) and washers (Figure 1, Item 7) securing fan (Figure 1, Item 8) and drive plate (Figure 1, Item 9) to flywheel (Figure 1, Item 10). Remove wires holding fan and drive plate together when installing bolts. Torque bolts (Figure 1, Item 6) 29 to 31 ft•lbs (39 to 42 N•m).
5. Install screen (Figure 1, Item 4) on generator frame/stator assembly (Figure 1, Item 5) with new lock washer (Figure 1, Item 3), washer (Figure 1, Item 2), and bolt (Figure 1, Item 1). Torque bolt (Figure 1, Item 1) 7 to 9 ft•lbs (9.5 to 12 N•m).

INSTALLATION – CONTINUED

6. Remove wooden wedges between engine and skid base.
7. Install generator mounting hardware (WP 0104, Installation Step 9).
8. Install generator set rear housing section (WP 0018, Installation).
9. Connect negative battery cable and close left side engine access door.
10. Start generator set and check for proper operation.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

WINTERIZATION KIT, GENERAL INFORMATION

INITIAL SETUP:

References

TM-9-6115-641-24P
Initial Setup:
WP 0149, Table 1

SCOPE

WP 0109 through WP 0130 is for your use in operating and maintaining the Winterization Kit installed on the 5 kW Tactical Quiet Generator Sets. WP 0109 through WP 0130 covers field maintenance, installation instructions, and removal instructions as well as troubleshooting procedures for the kit.

LEVELS OF MAINTENANCE

Army users shall refer to the Standard Two-Level MAC for tasks and levels of maintenance to be performed.

SUPPORTING INFORMATION FOR REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

Common Tools and Equipment

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your equipment.

Special Tools, TMDE, and Special Support Equipment. There are no special tools or support equipment required to perform field level maintenance on the generator set. A list of recommended tools and support equipment required to maintain the generator set is contained in WP 0149, Table 2.

Repair Parts. Repair parts and equipment are listed and illustrated in the Repair Parts and Special Tools List (RPSTL) manual, TM 9-6115-641-24P.

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, EQUIPMENT DESCRIPTION AND DATA**

INITIAL SETUP:**Personnel Required**

91D (1)

Equipment ConditionGen Set with Win Kit Properly Installed

GENERAL

The Winterization Kit is designed to be mounted in generator sets where extreme cold temperatures are anticipated. The kit consists of a coolant heater, which allows the generator set to operate to -50 °F (-45.6 °C). The coolant heater circulates the coolant from the generator set through the heater pump and heats the coolant by the heater and returns it back through the radiator of the generator set. The cycle continues until the temperature reaches 176 °F (80 °C). The heater then goes into low-heat mode; if the coolant temperature drops to 158 °F (70 °C), the heater will switch to high-heat mode.

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**Characteristics**

The Winterization Kit consists of a coolant heater, which allows the generator set to operate to -50 °F (-45.6 °C).

Capabilities and Features

The heater burns fuel from the generator fuel tank to heat the coolant, which is pumped through the engine block. The kit consists of a heater and coolant pump, a control unit, an ON-OFF switch, a fuel pump and line, coolant circulating lines, a wiring harness and mounting hardware to ensure operation to -50 °F (-45.6 °C).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Figure 1 illustrates the major components of the kit and shows their locations on the 5 kW Tactical Quiet Generator Set. (Refer to Table 1 for item names).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

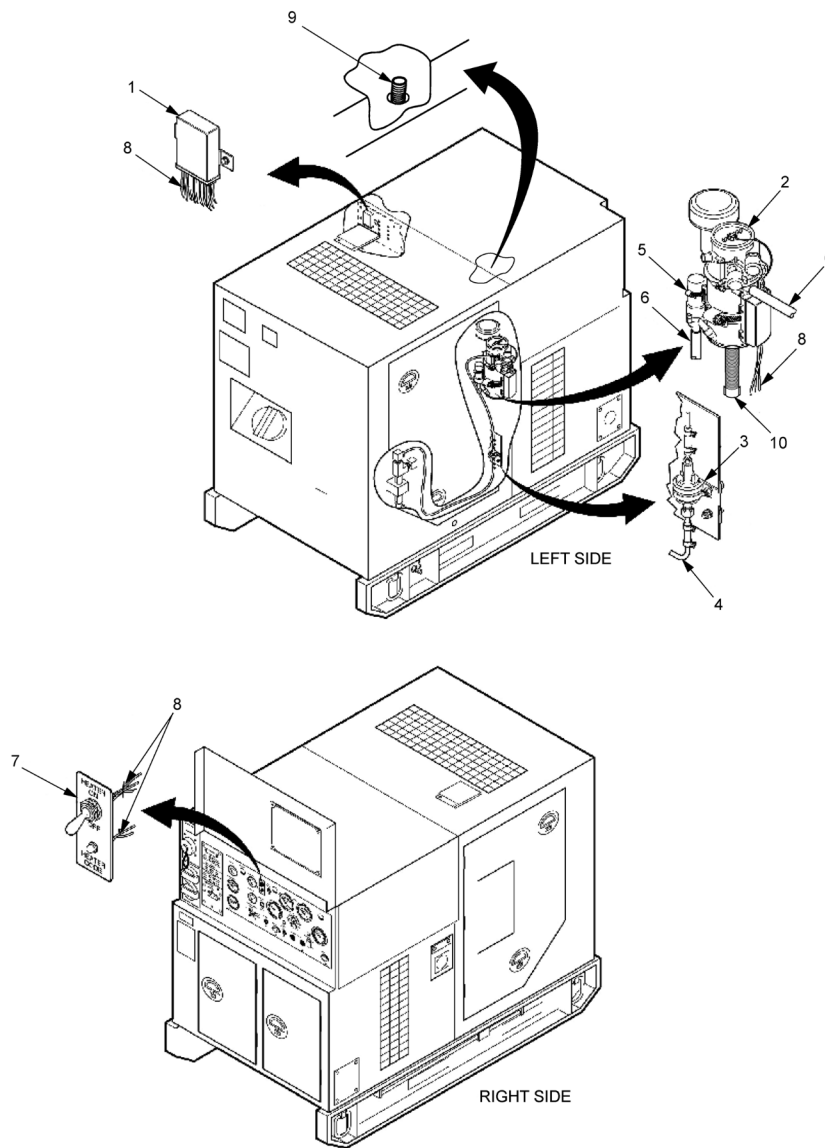


Figure 1. Location of Major Components.

Table 1. Description of Major Components.

ITEM NO.	ITEM NAME	DESCRIPTION
	Winterization Kit	A fuel-burning heater, pre-heats engine coolant permitting generator set operation to -50 °F (-45.6 °C).
1	Control Unit	Controls heater operations.
2	Heater	Heats coolant for operation in extreme cold temperatures.
3	Fuel Pump	Pumps fuel from the generator set fuel tank to the heater.
4	Fuel Lines	Provides a means of transporting fuel to heater.
5	Coolant Pump	Circulates coolant from generator set through the heater.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED**Table 1. Description of Major Components. – Continued**

ITEM NO.	ITEM NAME	DESCRIPTION
6	Coolant Lines	Provides a means of transporting coolant for circulation.
7	Switch/Lamp	Switches heater on or off and lamp indicates heater function codes.
8	Wiring Harness	Electrically connects Winterization Kit components.
9	Exhaust Hose	Provides a means of exhausting combustion gases from heater.
10	Air Inlet Hose	Provides intake air to Winterization Kit heater.

EQUIPMENT DATA

Tabulated data for the heater is located in Table 2.

Table 2. Tabulated Data for the Heater.

ITEM NAME		DATA
1.	Winterization Kit	
a.	National Stock Number	6115-01-476-8973
b.	Overall Length	10.78 in (273.98 mm)
c.	Overall Width	5.98 in (151.99 mm)
d.	Overall Height	7.81 in (198.50 mm)
e.	Weight	15 lbs (6.80 kg)
2.	Heater	
a.	Manufacturer	Active Gear
b.	Model	D5W
3.	Heating Capacity	Water Coolant
		High: 17,000 BTU/Hr
		Low: 4,250 BTU/Hr
4.	Rated Voltage	24 VDC
a.	Operating Voltage Range	20 to 28 VDC
b.	Current at 24 VDC	Start: 20 Amps/Hr
		Running High: 1.8 Amps/Hr
		Running Low: 1.2 Amps/Hr
5.	Fuel	Diesel
	Fuel Consumption	High: 0.06 Gal/Hr
		Low: 0.04 Gal/Hr

EQUIPMENT DATA – CONTINUED**Table 2. Tabulated Data for the Heater. – Continued**

ITEM NAME		DATA
6.	Coolant Pump Flow	250 Gal/Hr (946.352 L)

END OF WORK PACKAGE

FIELD MAINTENANCE
WINTERIZATION KIT, THEORY OF OPERATION

INITIAL SETUP:**Personnel Required**

91D (1)

Equipment ConditionGen Set with Win Kit Properly Installed

GENERAL

This work package contains a functional description of the Winterization Kit.

FUNCTIONAL DESCRIPTION

When the heater is switched on, the indicator lamp comes on, the combustion air fan blower comes on high, then low, and the start cycle begins. The water-circulating pump begins to run, and after a short time the fuel pump begins to operate. The fuel is ignited by the ignition element. A flame detector turns off the ignition element when combustion is established. When the coolant temperature has reached the operating point, the temperature sensor sends a signal to the control unit to reduce the heat output. If the temperature remains at the upper limit, the heater turns off, but the coolant pump continues to run. The heater will automatically restart once the system's temperature has dropped to the lower temperature switch point of the sensor. The heater continues to in this mode until the ON/OFF switch is placed in the OFF position. At this point the indicator lamp will go off, but the combustion air blower and the circulating pump will continue to run for several minutes, and then will shut off.

NOTE

Heater warms generator engine block sufficiently to start in below zero temperatures.

1. The circulation pump, ceramic glow plug, and combustion air fan start operation after the heater is turned on.
2. After approximately 50 seconds, the fuel pump starts, combustion starts, and the ceramic igniter/glow plug is turned off.
3. When the coolant temperature reaches 176 °F (80 °C), the heater switches to low-heat mode.
4. If the coolant temperature drops to 158 °F (70 °C), the heater switches to high-heat mode.
5. If the coolant temperature rises to 185 °F (85 °C), the heater will switch off (coolant pump continues to run).
6. The heater continues to run as described above until the ON/OFF switch is placed in the OFF position.
7. When switched off, the fuel pump stops and the flame is extinguished. The combustion air fan blower and coolant circulating pump continue to run for a 3-minute cool-down cycle.

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT, DESCRIPTION AND USE OF CONTROLS AND INDICATORS

INITIAL SETUP:

Personnel Required

91D (1)

References - cont'd

WP 0114, Initial Setup:

References

WP 0110, Initial Setup:

Equipment Condition

Gen Set with Win Kit Properly Installed

GENERAL

This work package describes and illustrates the Winterization Kit controls and indicators to ensure proper operations.

CONTROLS/INDICATORS

There are three controls/indicators; the heater indicator light, a control unit, and the ON-OFF switch.

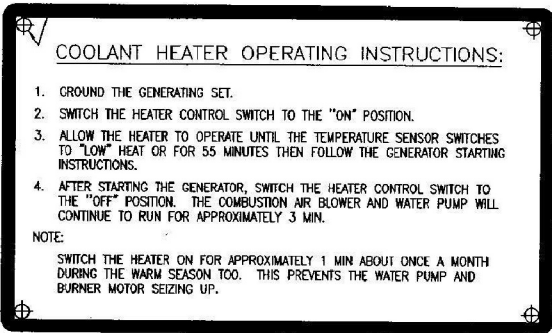
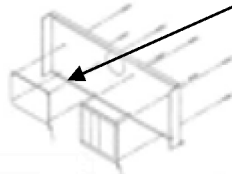
Heater Indicator Light. A light at the heater ON-OFF switch (WP 0110, Figure 1, Item 7) lights when the heater is operating. The light also serves as a troubleshooting code light (see WP 0114, Troubleshooting Procedures).

Control Unit. The control unit (WP 0110, Figure 1, Item 1) is a sealed unit, mounted on the generator wall, which controls heater operation.

Heater ON-OFF Switch. The ON-OFF switch (WP 0110, Figure 1, Item 7) is a single-pole, single-throw toggle switch. Placed in the ON position, the switch closes the 24 VDC circuit to the control unit and illuminates the heater indicator light.

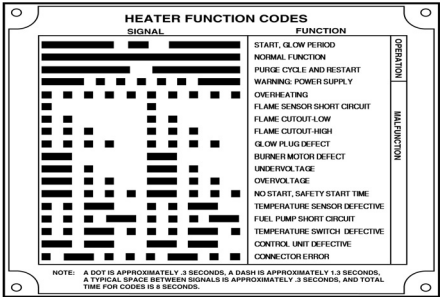
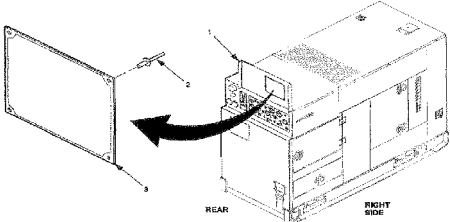
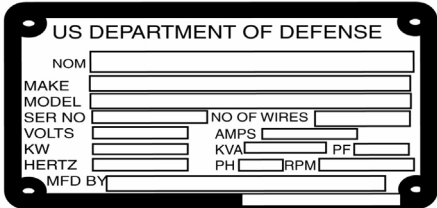
Function and Identification Plates. There are three data plates pertaining to the Winterization Kit. See Table 1 for description and corresponding figures for general graphic representation.

Table 1. Data Plates.

ITEM NAME/DESCRIPTION	FUNCTION/LOCATION
Heater Operating Instructions 	Mounted on generator control panel access door that describes heater operating procedures. Operating Instruction Plate 

CONTROLS/INDICATORS – CONTINUED

Table 1. Data Plates. – Continued

ITEM NAME/DESCRIPTION	FUNCTION/LOCATION
Function Code Plate 	Mounted on the generator control panel access door and lists the sequence of pulses for each malfunction. 
Identification Data Plate 	Mounted on the generator access door and identifies Winterization Kit characteristics.

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT, TROUBLESHOOTING INDEX

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

TM-9-2815-252-24
 WP 0118, Initial Setup:

Personnel Required

91D (1)

Equipment Condition

Gen Set with Win Kit Properly Installed

GENERAL

Refer to TM 9-2815-252-24 for engine troubleshooting procedures. This work package lists diagnostic and symptom related malfunctions you may find during operation of the generator set with the Winterization Kit installed and the generator set running. These pulses are shown visually on the Function Codes plate mounted inside the generator set control panel cover. Each malfunction is listed individually in the Symptom Index, and helps determine probable causes and corrective actions to take. The troubleshooting symptom or diagnostic fault index cannot list all faults that may occur, nor all the tests, inspections, and/or corrective actions. If a malfunction is not listed or cannot be corrected by listed corrective actions, notify your supervisor. There are two types of faults associated with troubleshooting: Symptom related Faults and Diagnostic Faults.

Symptom Related Faults

This is the soldier's ability to recognize faults occurring during normal operation that may or may not prompt a diagnostic/lamp fault.

Basic items of concern would include:

- Fuses
- Proper Electrical Connections
- Air Inlet and Exhaust Pipe clearance
- Fuel in the tank
- Correct Battery Voltage
- Coolant Flow

Diagnostic Faults

The indicator light near the heater switch is designed to blink code sequences to signal malfunctions in the system. See Heater Function Codes below.

HEATER FUNCTION CODES**Code Light Pulses**

The indicator light near the heater ON-OFF switch will blink in different sequences of long and short pulses to indicate malfunctions. A plate (Figure 1) mounted on the generator control panel access door (WP 0118, Figure 11) lists the malfunctions and shows each sequence of pulses for diagnostic faults given. Figure 2 provides an example of the Symptom Index Troubleshooting Table 1.

HEATER FUNCTION CODES		
SIGNAL	FUNCTION	
██████████ █ ██████████	START, GLOW PERIOD	OPERATION
████████████████████	NORMAL FUNCTION	
████████████████████ ██████████	PURGE CYCLE AND RESTART	MALFUNCTION
██████████ █ █ █ █ █ █ ██████████	WARNING: POWER SUPPLY	
█ █ █ █ █ █ █ █ █ █	OVERHEATING	
█ █ █ █ █ █ █ █ █ █	FLAME SENSOR SHORT CIRCUIT	
█ █ █ █ █ █ █ █ █ █	FLAME CUTOUT-LOW	
█ █ █ █ █ █ █ █ █ █	FLAME CUTOUT-HIGH	
█ █ █ █ █ █ █ █ █ █	GLOW PLUG DEFECT	
██████████ ██████████	BURNER MOTOR DEFECT	
██████████ █ ██████████ █	UNDERVOLTAGE	
██████████ █ █ ██████████ █ █	OVERVOLTAGE	
██████████ █ █ █ █ ██████████ █ █ █ █	NO START, SAFETY START TIME	
█ █ ██████████ █ █ ██████████	TEMPERATURE SENSOR DEFECTIVE	
█ █ ██████████ █ █ █ ██████████ █	FUEL PUMP SHORT CIRCUIT	
██████████ ██████████ ██████████ ██████████	TEMPERATURE SWITCH DEFECTIVE	
█ ██████████ █ █ █ ██████████ █ █	CONTROL UNIT DEFECTIVE	
	CONNECTOR ERROR	

NOTE: A DOT IS APPROXIMATELY .3 SECONDS, A DASH IS APPROXIMATELY 1.3 SECONDS, A TYPICAL SPACE BETWEEN SIGNALS IS APPROXIMATELY .3 SECONDS, AND TOTAL TIME FOR CODES IS 8 SECONDS.

SYMPTOM ## (dot, dash, dot...if present)
(Symptom Description or Fault Code Description)

- a.) Perform this test or inspection.
 - 1.) If result is good, perform this corrective/maintenance action or next step.
 - 2.) If result is not good, perform this corrective/maintenance action.

0113-2

NOTE

When the heater is switched on, the light will perform one of the sequences of light pulses shown visually on the Heater Function Codes Plate (Figure 1) mounted inside the generator set control panel cover. Before each symptom, this index lists in parentheses the light sequence associated with it.

Table 1. Symptom Troubleshooting Procedures Index.

MALFUNCTION/SYMPOM	TROUBLESHOOTING PROCEDURE
(dash, dash) - Heater Restart Attempted During Purge Cycle	1
(dash, 5 dots, dash) - Warning: Power Supply	2
(10 dots) - Overheating	3
(dot, dot) - Flame Sensor Short-Circuit	4
(2 dots, 2 dots) - Flame Cutout-LOW	5
(3 dots, 3 dots) - Flame Cutout-HIGH	6
(4 dots, 4 dots) - Glow Plug Defect	7
(dash, dash) - Burner Motor Defect	8
(dash, dot, dash, dot) - Under Voltage	9/10
(dash, 2 dots, dash, 2 dots) - Over Voltage	9/10
(dash, 3 dots, dash, 3 dots) - Non-Start	11
(2 dots, dash, 2 dots, dash) - Temperature Sensor Defective	12
(3 dots, dash, 3 dots, dash) - Fuel Pump Short Circuit	13/14/15/16
(2 dots, dash, 3 dots, dash, dot) - Temperature Switch Defective	13/14/15/16
(4 dashes) - Control Unit Defective	13/14/15/16
(dot, dash, 3 dots, dash, 2 dots) - Connection Error	13/14/15/16
No Indication of Heater Operation When Switch is in ON Position	17

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT, TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Test Equipment**

Multimeter

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

References

Service Upon Receipt (WP 0006)

WP 0118, Initial Setup:

WP 0119, Initial Setup:

WP 0120, Initial Setup:

WP 0121, Initial Setup:

WP 0127, Initial Setup:

WP 0128, Initial Setup:

Equipment Condition

Gen Set (FMC) with Win Kit Properly Installed

TROUBLESHOOTING PROCEDURE(S)**SYMPTOM 1**

1. (dash, dash) Purge Cycle and Heater Restart (Starts while heater still NOT shut OFF)

TEST OR INSPECTION

If the heater fails to start the first time, it will automatically attempt a second start as long as coolant temperature is 158 °F (70 °C). If that attempt fails, the heater will automatically shut down.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure battery power is still applied and EMERGENCY STOP SWITCH is pushed IN.
- c. Release DCS control panel by turning two fasteners and lowering panel.

NOTE

See WP 0118, Figure 10 for all Wiring Harness troubleshooting.

- d. Check fuel level, check for leaks and that fuel pump is properly working. Place a container under the output end of the fuel pump line and remove the line. Turn the pump on and observe the fuel flow.
 - (1) If no fuel leaks and pump IS working properly, go to Step e.
 - (2) If fuel pump is NOT working properly, continue to SYMPTOM 13 (Fuel Pump Short Circuit).
- e. Ensure purge cycle of at least 90 seconds has elapsed and coolant temperature falls below the triggering point of 158 °F (70 °C).
 - (1) If temperature is as specified and flame is NOT stable, inspect glow plug for proper seating. See WP 0128.

SYMPTOM 1 – CONTINUED

- (2) If temperature is as specified and flame IS stable, replace heater assembly per WP 0120.

SYMPTOM 2

2. (dash, 5 dots, dash) Warning: Power Supply

TEST OR INSPECTION**WARNING**

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

This fault will more than likely accompany SYMPTOMS 9/10 and a safety shut down will occur.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure battery power is still applied and EMERGENCY STOP SWITCH is pushed IN.
- c. Release DCS control panel by turning two fasteners and lowering panel.
- d. Record any accompanying fault/s and check voltage output of batteries.
 - (1) If voltage is less than 21 VDC, check electrolyte levels as per WP 0010. Charge batteries as necessary.
 - (2) If voltage is greater than 30 VDC, troubleshoot 25A main fuse(s) as per wiring diagram WP 0118, Figure 10.
 - (3) If voltage is within normal range between 21 and 30 VDC, replace control unit per WP 0119.

SYMPTOM 3

3. (10 dots) Overheating

TEST OR INSPECTION

If the temperature of the heat exchanger or the coolant rises above 185 °F (85 °C) at any given time, this fault will more than likely produce a safety cut out and malfunction shutdown. Fault is normally due to a lack of water/coolant, air restriction, or poorly bled coolant system.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

CAUTION

Coolant must contain a minimum of 10% antifreeze at all times to protect against corrosion. Fresh water will corrode internal heater parts.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure EMERGENCY STOP SWITCH is pushed IN on generator set.
- c. Release DCS control panel by turning two fasteners and lowering panel.

SYMPTOM 3 – CONTINUED**CAUTION**

Coolant must contain a minimum of 10% antifreeze at all times to protect against corrosion. Fresh water will corrode internal heater parts.

- d. Check coolant level and add coolant as required per WP 0006, Radiator.
- e. Check to ensure coolant pump is working properly. Measure continuity of coolant pump wiring: A2-C2 and A1-1 (A1-2 GND).
 - (1) If continuity is present, go to Step f.
 - (2) If continuity is not present, repair/replace wiring harness as required per WP 0127.
- f. Check to ensure voltage is present at positive end of coolant pump with ON/OFF heater switch in the ON position.
 - (1) If voltage is as specified, replace heater per WP 0143.
 - (2) If voltage is NOT as specified, go to SYMPTOM 2 (Warning: Power Supply).

SYMPTOM 4

- 4. (dot, dot) Flame Sensor Short Circuit

TEST OR INSPECTION

The flame is monitored by the flame sensor and at the point of ignition, will automatically switch the glow plug OFF. This fault will typically present itself in the event fuel quantities are sufficient and no flame is found.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

See WP 0118, Figure 10 for Wiring Harness troubleshooting.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure EMERGENCY STOP SWITCH is pushed IN on generator set.
- c. Remove heater assembly and test according to WP 0120 (Heater Assembly).
 - (1) If flame sensor is good, repair/replace wiring harness as required (WP 0127).
 - (2) If continuity is NOT good, replace heater assembly (WP 0120, Heater Assembly).

SYMPTOM 5

- 5. (2 dots, 2 dots) Flame Cutout - LOW

TEST OR INSPECTION

The flame is monitored by the flame sensor and at the point of ignition, will automatically switch the glow plug OFF. This fault will typically present itself when there is NOT a sufficient fuel supply or fuel pump operation is suspect. A higher than normal blower motor RPM (greater than 5,500) may also prevent flame from sustaining itself. A fault shutdown is imminent.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

SYMPTOM 5 – CONTINUED

NOTE

See WP 0118, Figure 10 for Wiring Harness troubleshooting.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure EMERGENCY STOP SWITCH is pushed IN on generator set.
- c. Turn heater switch momentarily OFF and then back ON to reset the fault shutdown. If heater does not start, it will continue to shut down.
- d. Check fuel level and/or fuel line restrictions. Refill if needed.
- e. Test fuel metering pump per WP 0121 for proper operation.
 - (1) If fuel metering pump works as specified, continue to Step f.
 - (2) If fuel metering pump does NOT work as specified, repair/replace fuel metering pump per WP 0121.
- f. Measure blower motor voltage at A2-Pin C5. If voltage is not as specified, verify 24 VDC power source and/or replace heater control unit per WP 0119.

SYMPTOM 6

6. (3 dots, 3 dots) Flame Cutout - HIGH

TEST OR INSPECTION

The flame is monitored by the flame sensor and at the point of ignition, will automatically switch the glow plug OFF. This fault will typically present itself when the heater and/or fuel system is under extreme use and develops vapor lock in the fuel line.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

See WP 0118, Figure 10 for J7 Wiring Harness troubleshooting.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure EMERGENCY STOP SWITCH is pushed IN on generator set.
- c. Turn heater switch momentarily OFF and then back ON to reset the fault shutdown. If heater does not start, it will continue to shut down.
- d. Check for use of proper fuel and fill level. Refill if needed.

NOTE

- e. Ensure that fuel line is routed away from the heater assembly and exhaust.
Check installation position of fuel metering pump per WP 0121, Installation.

NOTE

- f. Variances greater than 15° from vertical could cause fuel blockage.
Remove possible vapor lock from fuel line. Reduced suction will caution vapor in the line. See testing per WP 0121.

SYMPTOM 7

7. (4 dots, 4 dots) Glow Plug Defect

TEST OR INSPECTION

The flame is monitored by the flame sensor and at the point of ignition, will automatically switch the glow plug OFF. IF the glow plug is faulty, then it will not start regardless.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

See WP 0118, Figure 10 for Wiring Harness troubleshooting.

CORRECTIVE ACTION

- a. Shutdown generator set and wait for a period of 30 minutes.
- b. Make sure EMERGENCY STOP SWITCH is pushed IN on generator set.
- c. Turn heater switch momentarily OFF and then back ON to reset the fault shutdown. If heater does not start, it will continue to shut down.
- d. Perform TESTING procedures per WP 0128, Igniter/Glow Plug and Resistor to determine if glow plug or resistor is faulty.
 - (1) If glow plug and resistor continuity is good, continue to Step e.
 - (2) If glow plug or resistor is bad, replace as needed.
- e. Measure continuity between A2-C Pin 3 and HR Pin 2 and HR Pin 1 and HR Pin 2. If continuity is NOT good, repair/replace wiring harness as required per WP 0127.

SYMPTOM 8

8. (dash, dash) Burner Motor Defect

TEST OR INSPECTION

When the heater is started, the functioning of the blower motor is checked once. If it does not start, the heater will undergo a fault shutdown. During operation, the blower motor is monitored in cycles. If the motor speed is below the permitted limit, a fault shutdown will also occur. A fault shutdown may or may not occur during rough idling. This is typically due to a fuel, air mixture, or low voltage related problem.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

See WP 0118, Figure 10 for Wiring Harness troubleshooting.

CORRECTIVE ACTION

- a. Shutdown generator set and wait for a period of 30 minutes.
- b. Make sure EMERGENCY STOP SWITCH is pushed IN on generator set.
- c. Turn heater switch momentarily OFF and then back ON to reset the fault shutdown. If heater does not start, it will continue to shut down.
- d. Clear any obstructions or debris from air intake or exhaust lines.

SYMPTOM 8 – CONTINUED

- e. Check 7.5 AMP fuse.
 - (1) If fuse is bad, replace fuse as required.
 - (2) If fuse is good, continue to Step f.
- f. Measure voltage at A1- Pin 4 and GND to determine correct voltage is applied. If voltage is NOT as specified, replace heater assembly per WP 0120.

SYMPTOM 9 AND 10

- 9. (dash, dot, dash, dot) Under Voltage
- 10. (dash, 2 dots, dash, 2 dots) Over Voltage

TEST OR INSPECTION

SYMPTOM 2 may or may not illuminate simultaneously with a SYMPTOM 9 or 10 fault. Troubleshooting for all three should be carried out in the same procedure as directed below. A fault shutdown will occur in the event the voltage is less than 21 VDC or greater than 30 VDC.

NOTE

See SYMPTOM 2 (Warning: Power Supply).

SYMPTOM 11

- 11. (dash, 3 dots, dash, 3 dots) Non-Start, Automatic Cut-Out

TEST OR INSPECTION

This fault is the result of having one or more faults causing multiple indications simultaneously. As described below, this fault should be the LAST malfunction to troubleshoot if there are a series of malfunctions in order to find the root of the problem. Some of these symptoms may be eliminated due to proper PMCS being performed. Those include but not limited to:

- Fuel/Ignition system (SYMPTOM 5)
- Power requirements (SYMPTOM 2)
- Intermittent wiring or cable connections (SYMPTOM 15)

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

If the heater fails to start the first time, it will automatically attempt a second start as long as coolant temperature is 158 °F (70 °C). If that attempt fails, the heater will automatically shut down.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure battery power is still applied and EMERGENCY STOP SWITCH is pushed IN.
- c. Release DCS control panel by turning two fasteners and lowering panel.

NOTE

See WP 0118, Figure 10 for all Wiring Harness troubleshooting.

- d. Have all other SYMPTOMS been extinguished?
 - (1) If other SYMPTOMS exist, go to those respective SYMPTOMS.

SYMPTOM 11 – CONTINUED

- (2) If there are no other SYMPTOMS, and fault still exist, replace control unit per WP 01939.

SYMPTOM 12

12. (2 dots, dash, 2 dots, dash) Temperature Sensor Defective

TEST OR INSPECTION

The temperature sensor is a device to acknowledge temperature change. If the temperature of the heat exchanger wall or the coolant rises above the maximum permissible temperature, the safety thermal cutout fuse (switch) is blown and initiates a malfunction shutdown. The inability to switch between LOW- and HIGH-Heat modes presents the possibility of a SYMPTOM 12 or 13 fault.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

If the heater fails to start the first time, it will automatically attempt a second start as long as coolant temperature is 158 °F (70 °C). If that attempt fails, the heater will automatically shut down.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure battery power is NOT applied and EMERGENCY STOP SWITCH is pushed IN.
- c. Remove Heater Assembly and test according to WP 0120.
- d. Turn heater switch momentarily to OFF and then back ON to reset the fault shutdown.
 - (1) If sensor is bad, replace heater assembly (WP 0120).
 - (2) If sensor is good and fault still remains, repair/replace wiring harness per WP 0127.

SYMPTOM 13, 14, 15, 16

13. (3 dots, dash, 3 dots, dash) Fuel Pump Short Circuit
14. (2 dots, dash, 3 dots, dash, dot) Temperature/Thermal Cutout Switch (Fuse Defective)
15. (4 dashes) Control Unit Defective
16. (dot, dash, 3 dots, dash, 2 dots) Connection Error

TEST OR INSPECTION

The above faults are usually as a result of a bad connection or considered an intermittent fault. Follow the procedures below as the corrective action is the same for each.

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

CORRECTIVE ACTION

- a. Troubleshoot the above SYMPTOM fault conditions by checking for possible wiring harness disconnects.
- b. Turn heater switch momentarily to OFF and then back ON to reset the fault shutdown. If wiring harness and/or connections are good, replace the respective faulty component:

SYMPTOM 13, 14, 15, 16 – CONTINUED

- Fuel Pump Short Circuit per WP 0121.
- Temperature/Thermal Cutout Switch (heater assembly per WP 0120).
- Control Unit per WP 0119.
- Wiring Harness per WP 0127.

SYMPTOM 17

17. (No Indication of Heater Operation When Switch is in ON Position)

TEST OR INSPECTION

Some of these symptoms may be eliminated due to proper PMCS being performed. Those include but not limited to:

- Power requirements (SYMPTOM 2).
- Intermittent wiring or cable connections (SYMPTOM 16).

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

NOTE

If the heater fails to start the first time, it will automatically attempt a second start as long as coolant temperature is 158 °F (70 °C). If that attempt fails, the heater will automatically shut down.

CORRECTIVE ACTION

- a. Shutdown generator set.
- b. Make sure 24±2 VDC battery power is still applied and EMERGENCY STOP SWITCH is pushed IN.
- c. Release DCS control panel by turning two fasteners and lowering panel.

NOTE

See WP 0118, Figure 10 for all Wiring Harness troubleshooting.

- d. Check 7.5A fuse (XF1) supplying power to blower motor.
 - (1) If fuse is bad, replace if needed.
 - (2) If fuse is good, continue to Step e.
- e. Check for +24 VDC at S1-2 on heater switch.
 - (1) If voltage is as specified, continue to Step f.
 - (2) If voltage is not as specified, continue checking for +24 VDC between power source and heater switch according to WP 0127.
- f. Place S1 switch to ON position and check for +24 VDC at S1-3.
 - (1) If voltage is as specified, continue to Step g.
 - (2) If voltage is not as specified, replace S1 per WP 0144.
- g. Remove A2-Test connector from control unit. Check for +24 VDC at Pin S with S1 in ON position.
 - (1) If voltage is as specified, continue to Step h.
 - (2) If voltage is not as specified, repair/replace wiring harness (WP 0127).
- h. Remove A2-A connector (6 pin) from control unit. Check continuity from Pin 3 to GND.
 - (1) If circuit indicates short, replace control unit per WP 0119.

SYMPTOM 17 – CONTINUED

- (2) If circuit indicates an open, repair/replace wiring harness (WP 0127).

END OF WORK PACKAGE

FIELD MAINTENANCE
WINTERIZATION KIT, SERVICE UPON RECEIPT

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

References

WP 0118, Initial Setup:

WP 0130, Initial Setup:

Equipment Condition

Gen Set (FMC)

Complete Win Kit

SERVICE UPON RECEIPT OF MATERIEL

If the Winterization Kit is already installed on the generator set, the normal service on receipt of the generator set is sufficient, and no separate service on receipt is required by field for the winterization kit. If the kit is not installed, refer to WP 0118.

REMOVAL INSTRUCTIONS

Refer to WP 0130.

END OF WORK PACKAGE

FIELD MAINTENANCE
WINTERIZATION KIT, PMCS INTRODUCTION

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Materials/PartsGloves & Additional Protective Clothing
Dry Cleaning Solvent (WP 0150, Table 1, Item 20)**Personnel Required**

91D (1)

References

DA-FORM-2404

References - cont'dDA-PAM-750-8
SF-FORM-368
WP 0117, Initial Setup:**Equipment Condition**

Gen Set (FMC) with Win Kit Properly Installed

Special Environmental ConditionAdequately Ventilated Work Area
Cleaning Solvent is toxic to eyes, skin, and respiratory tract

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

GENERAL

WP 0117, Table 1, (PMCS Table) has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

Warnings, Cautions, and Notes

Always observe the **WARNINGS**, **CAUTIONS**, and **NOTES** appearing in your PMCS table. Warnings and cautions appear before applicable procedures. You must observe these **WARNINGS** to prevent serious injury to yourself and others. You must observe **CAUTIONS** to prevent your equipment from being damaged. You must observe **NOTES** to ensure procedures are performed properly.

Explanation of Table Entries

The PMCS table is divided into five columns. Each column is explained in the following paragraphs.

Item No. Column. Numbers in this column are for reference. When completing DA Form 2404 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

Interval Column. This column tells you when you must do the procedure in the procedure column. "Before" procedures must be done before you operate the equipment for its intended mission. "During" procedures must be done during the time you are operating the equipment for its intended mission. "After" procedures must be done immediately after you have operated the equipment, or immediately after shutting down the equipment. Perform "Weekly" procedures at the listed interval.

Item to be Checked or Serviced Column. This column lists the location and the item to be checked or serviced. The item location is underlined.

GENERAL – CONTINUED

Procedure Column. This column gives the procedure for checking or servicing the item listed in the location, item to check/service column. You must perform the procedure to know if the equipment is ready or available for its intended mission or operation. You must do the procedure at the time stated in the interval column.

Equipment Not Ready/Available if: Column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make checks or services that show faults listed in this column, do not operate the equipment.

Other Table Entries

Be sure to observe all special information and notes that appear in your table.

Special Instructions

Preventive maintenance is not limited to performing the checks and services listed in the PMCS Table. Figure 1 depicts general Winterization Kit PMCS routing. Covering unused receptacles, stowing unused accessories and other routine procedures such as equipment inventory, cleaning components, and touch up painting are not listed in the table. These are things you should do any time you see that they need to be done. If a routine check is listed in the PMCS Table, it is because experience has shown that problems may occur with this item. Take along tools and cleaning cloths needed to perform the required checks and services. Use the following information to help identify potential problems before and during checks and services. Use the information in the following paragraphs to help you identify problems at any time.

Routine Inspections. Use the following information to help identify potential problems before and during checks and Services.

WARNING

Dry cleaning solvent used to clean parts is potentially dangerous to personnel and property. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes. Wear goggles and rubber gloves to protect eyes and skin. Wash exposed skin thoroughly. Do not smoke or use near open flame or excessive heat. Failure to observe this warning could result in severe personal injury or death.

WARNING

All metal jewelry can conduct electricity and become entangled in generator set components. Remove all jewelry when working on generator set. Failure to comply with this warning can cause injury or death to personnel.

WARNING

DO NOT wear loose clothing when performing checks, services and maintenance. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Make sure unit or units are completely shut down and free of any power source before attempting any repair or maintenance on the unit, switch box or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

CAUTION

Keep cleaning solvents, gasoline, and lubricants away from rubber or soft plastic parts. They will deteriorate material.

GENERAL – CONTINUED

1. Keep it clean. Dirt, grease, and oil get in the way and may cover up a serious problem. Use dry cleaning solvent to clean metal surfaces.
2. Use soap and water to clean rubber or plastic parts and material.
3. Check all bolts, nuts, and screws to make sure they are not loose, missing, bent, or broken. Do not try to check them with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find one loose, report it to the next higher level of maintenance.
4. Inspect welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If a broken weld is found, report it to the next higher level of maintenance.
5. Inspect electrical wires, connectors, terminals, and receptacles. Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure wires are in good condition. Examine terminals and receptacles for serviceability. If deficiencies are found, report them to the next higher level of maintenance.
6. Inspect hoses and fluid lines. Look for wear, damage, and leaks. Make sure that clamps and fittings are tight. Wet spots and stains around a fitting or connector can mean a leak. If a leak comes from a loose connector, or if something is broken or worn out, report it to the next higher level of maintenance.

Leakage Definitions

You must know how fluid leakage affects the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them. When in doubt, notify your supervisor.

LEAKAGE CLASS	LEAKAGE DEFINITION
Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops, but not enough to cause drops to drip from the item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

Operation of the Equipment with Minor Leaks**CAUTION**

Equipment operation is allowable with minor leakage (Class I or II) of any fluid except fuel. Fluid capacity must be considered before deciding to continue operation of the equipment with minor leaks. When operating with Class I or II leaks, fluid level must be checked more often than required by the PMCS table. Parts without fluid will stop working and or cause equipment damage.

1. Consider the equipment's capacity for the fluid that is leaking. If the capacity is small, the fluid level may soon become too low for continued operation. If in doubt, *notify your supervisor*.
2. Check the fluid level more often than required in the PMCS table. Add fluid as needed.

Corrosion Prevention and Control (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process

GENERAL – CONTINUED

that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

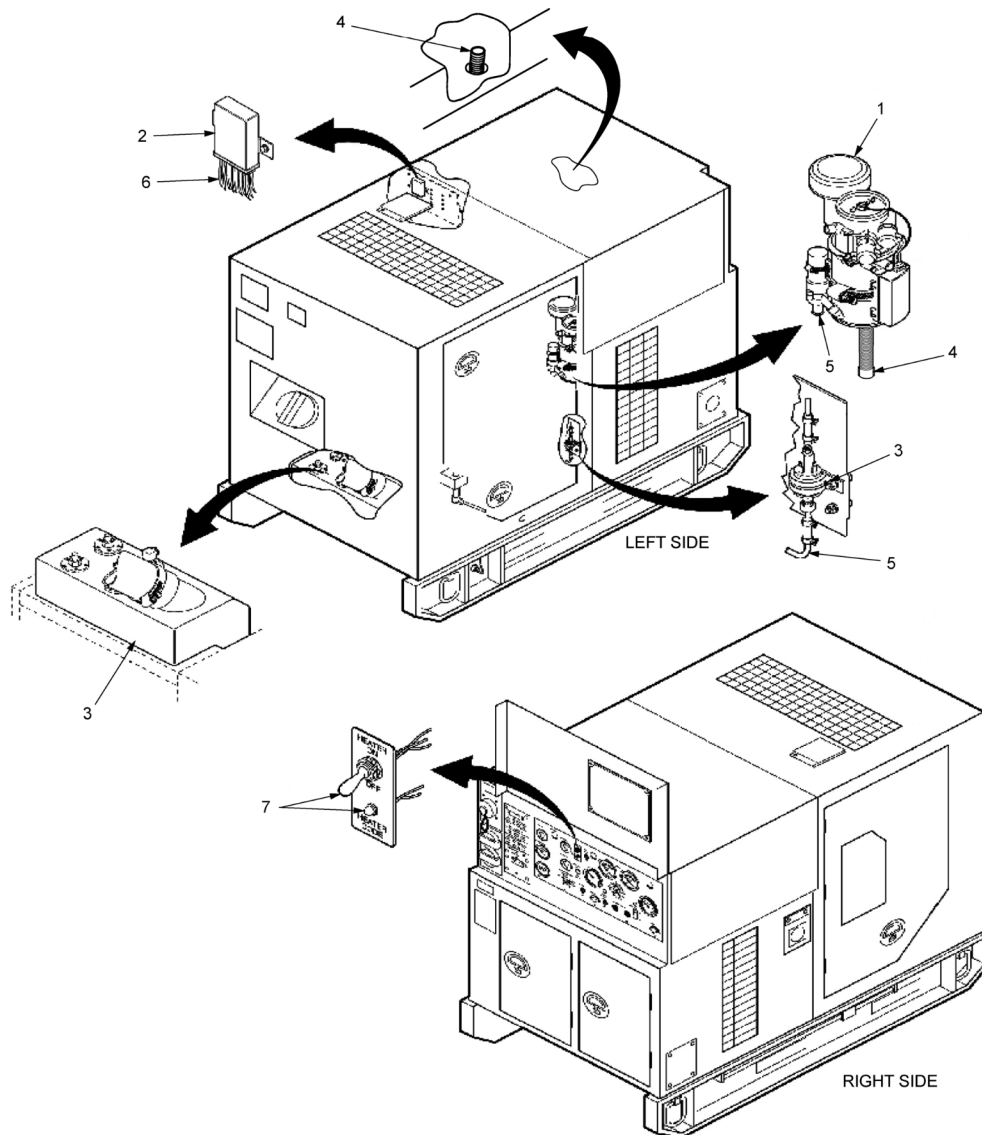


Figure 1. PMCS Routing Diagram.

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT, PMCS, INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Additional Protective Clothing
 Splash-proof Goggles
 Dry Cleaning Solvent (WP 0150, Table 1, Item 20)

Personnel Required

91D (1)

References

TM-9-6115-641-10
 PMCS, Including Lubrication Instructions (WP 0008)

Equipment Condition

Gen Set (FMC) with Win Kit Properly Installed

Special Environmental Condition

Adequately Ventilated Work Area
 Cleaning Solvent is toxic to eyes, skin, and respiratory tract

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

Table 1. Preventive Maintenance Checks and Services.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
NOTE Be sure that Generator Set PMCS is completed first in accordance with WP 0008 and TM 9-6115-641-10.				
1	Before	VISUAL INSPECTION		
		HEATER ASSEMBLY	a. Check for damage. b. Ensure that heater assembly is mounted securely.	Damage that renders equipment unsafe. Heater not mounted securely.
		CONTROL UNIT	Check for loose or broken wires or damage.	Wires loose or broken or control unit damaged.
2	Before	FUEL AND COOLANT LINES	Check on, around, and under equipment for fuel, oil, or coolant leaks.	Class III coolant or any class fuel leak is detected.
		HEATER	Inspect heater for signs of leaks.	Class III coolant or any class fuel leak is detected.
		FUEL LINES	Inspect Winterization Kit fuel lines for kinks, leaks, loose or damaged clamps.	Fuel lines damaged; clamps missing.

Table 1. Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	Before	FUEL PUMP	Inspect fuel pump for leaks.	Any fuel leak.
		EXHAUST HOSE	Inspect for obstruction, missing or damaged mounting clamp.	Hose obstructed; hose or clamp missing or damaged.
		AIR INLET HOSE	Inspect for obstruction, missing or damaged mounting clamp.	Inlet hose obstructed.
WARNING				
Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.				
3	Before	WINTERIZATION KIT COOLANT LINES	Inspect for loose, damaged or missing clamps. Inspect for leaks.	Class III leaks or missing clamps or hoses. Class III leaks or missing clamps or hoses.
		COOLANT PUMP	Inspect for leaks.	Class III leaks or missing clamps or hoses.
		BYPASS VALVE	Inspect for leaks, damage, loose clamps, or other damage.	Class III leaks or missing clamps or hoses.
4	Before	WIRE HARNESS	Inspect wiring for burned or frayed insulation or loose terminals.	Wiring is loose or burned.
5	During	HEATER CONTROL AND SWITCH LAMP	a. Check that indicator light is on when heater is operating. b. Check Heater function Code Plate.	Lamp blinks showing failure in accordance with Heater Function Code Plate.
6	After	HEATER ASSEMBLY	a. Check for damage. b. Ensure that heater assembly is mounted securely.	Damage that renders equipment unsafe. Heater not mounted securely.
		CONTROL UNIT	Loose or broken wires or damage.	Wires loose or broken or control unit damaged.
		FUEL AND COOLANT LINES	Check on, around, and under equipment for fuel, oil, or coolant leaks.	Class III coolant or any class fuel leak is detected
7	After	HEATER	Inspect heater for signs of leaks.	
		FUEL LINES	Inspect Wwinterization Kit fuel lines for kinks, leaks, loose or damaged clamps.	Fuel lines damaged, clamps missing, or any leaks.
		FUEL PUMP	Inspect fuel pump for leaks.	Any fuel leak.
		EXHAUST HOSE	Inspect for obstruction, missing or damaged mounting clamp.	Obstructed exhaust.

Table 1. Preventive Maintenance Checks and Services. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
		AIR INLET HOSE	Inspect for obstruction, missing or damaged mounting clamp.	Air inlet obstructed.
WARNING Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.				
8	After	WINTERIZATION KIT COOLANT LINES	Inspect for loose, damaged or missing clamps. Inspect for leaks.	Class III leaks or missing clamps or hoses.
		COOLANT PUMP	Inspect for leaks.	Class III leaks or missing clamps or hoses.
		BYPASS VALVE	Inspect for leaks, damage, loose clamps, or other damage.	Class III leaks or missing clamps or hoses.
9	After	WIRE HARNESS	Inspect wiring for burned or frayed insulation or loose terminals.	Wiring is loose or damaged.
10	After	HEATER CONTROL AND SWITCH LAMP	Check that indicator light is operable. Check Heater Function Code Plate.	Indicator light not operable. Heater Function Code Plate missing.

MANDATORY REPLACEMENT PARTS LIST

There are no replacement parts required for these PMCS procedures.

LUBRICATION INSTRUCTIONS

No lubrication is required on the Winterization Kit.

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT, INSTALLATION PROCEDURES

INITIAL SETUP:**Test Equipment**

Multimeter
Jumper Wire

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof Goggles
New Lockwashers
Coolant & Diesel fuel

Personnel Required

91D (1)

References

TM-9-6115-641-10
TM-9-2815-252-24
Batteries (WP 0010)
Air Cleaner Assembly (WP 0069)
Radiator (WP 0072)
Fuel Transfer Pump (WP 0087)

Equipment Condition

Gen Set (FMC)
Complete Win Kit

Special Environmental Condition

Adequately Ventilated Work Area
Coolant and Diesel fuel is toxic to eyes, skin, and respiratory tract

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION INSTRUCTIONS

The following instructions have been provided so you can install the Winterization Kit, NSN: 6115-01-476-8973 on your 5 kW Generator Set.

INSTALLATION

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

INSTALLATION – CONTINUED

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Operators are to wash exposed skin and change chemical soaked clothing promptly if exposed to fuel. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

NOTE

Use packing list provided with kit.

1. Open engine access doors and disconnect negative battery cable from right battery and the positive battery cable from the left battery per paragraph WP 0010, Removal, before doing the following procedures.
2. Drain generator coolant system in accordance with TM 9-6115-641-10.
3. Remove generator air filter inlet hose in accordance with TM 9-6115-641-10 if needed.
4. Drill two 3/16 in diameter holes using control unit (Figure 1, Item 3), as template in center bulkhead housing (Figure 1, Item 4).

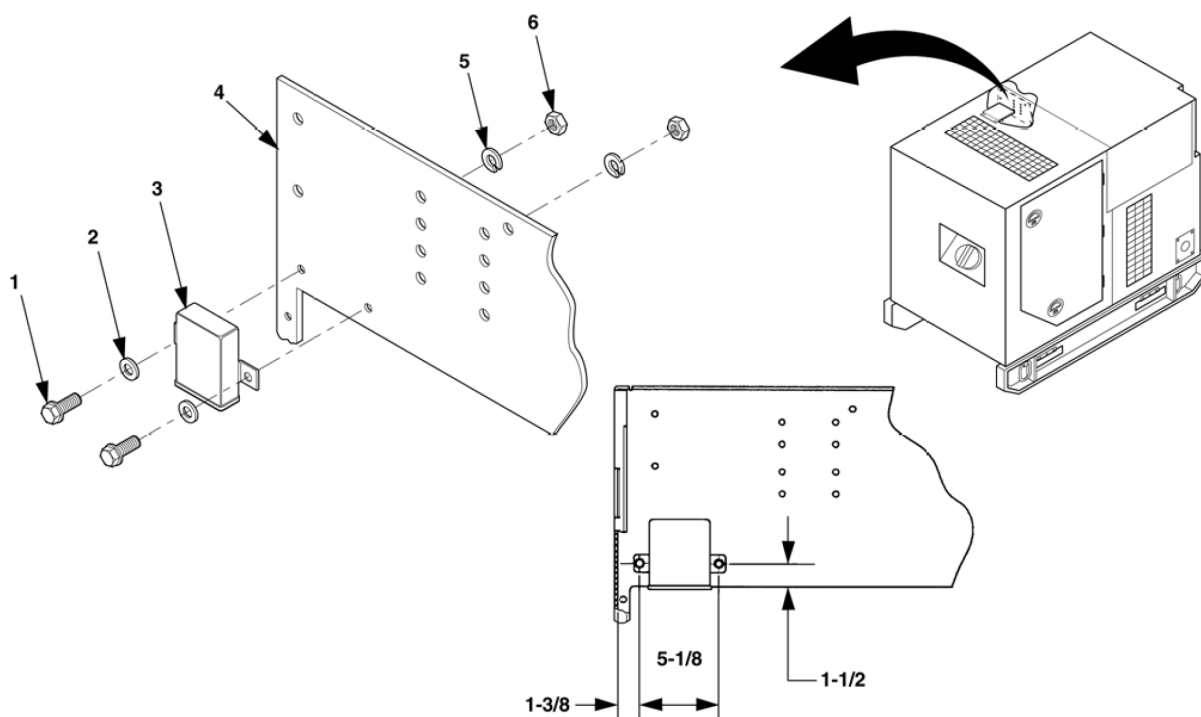


Figure 1. Winterization Kit Control Unit Assembly.

5. Install control unit (Figure 1, Item 3) to center bulkhead housing (Figure 1, Item 4) with screws (Figure 1, Item 1), washers (Figure 1, Item 2), new lockwashers (Figure 1, Item 5), and nuts (Figure 1, Item 6).
6. Reinstall generator air filter inlet hose (WP 0069, Installation).

INSTALLATION – CONTINUED

7. Remove left side fan guard (WP 0072, Removal).

NOTE

Seal all pipe threads with sealing compound contained in kit.

8. Disconnect the generator set fuel supply line and elbow from the generator set primary fuel pump (WP 0087, Removal).
9. Attach tee (Figure 2, Item 3) to generator set primary fuel pump (Figure 2, Item 1).
10. Attach the elbow (Figure 2, Item 2), and adapter (Figure 2, Item 4), to tee fitting (Figure 2, Item 3), along with butt splices (Figure 2, Item 12), fuel tubing (Figure 2, Item 7), and clamps (Figure 2, Item 11).

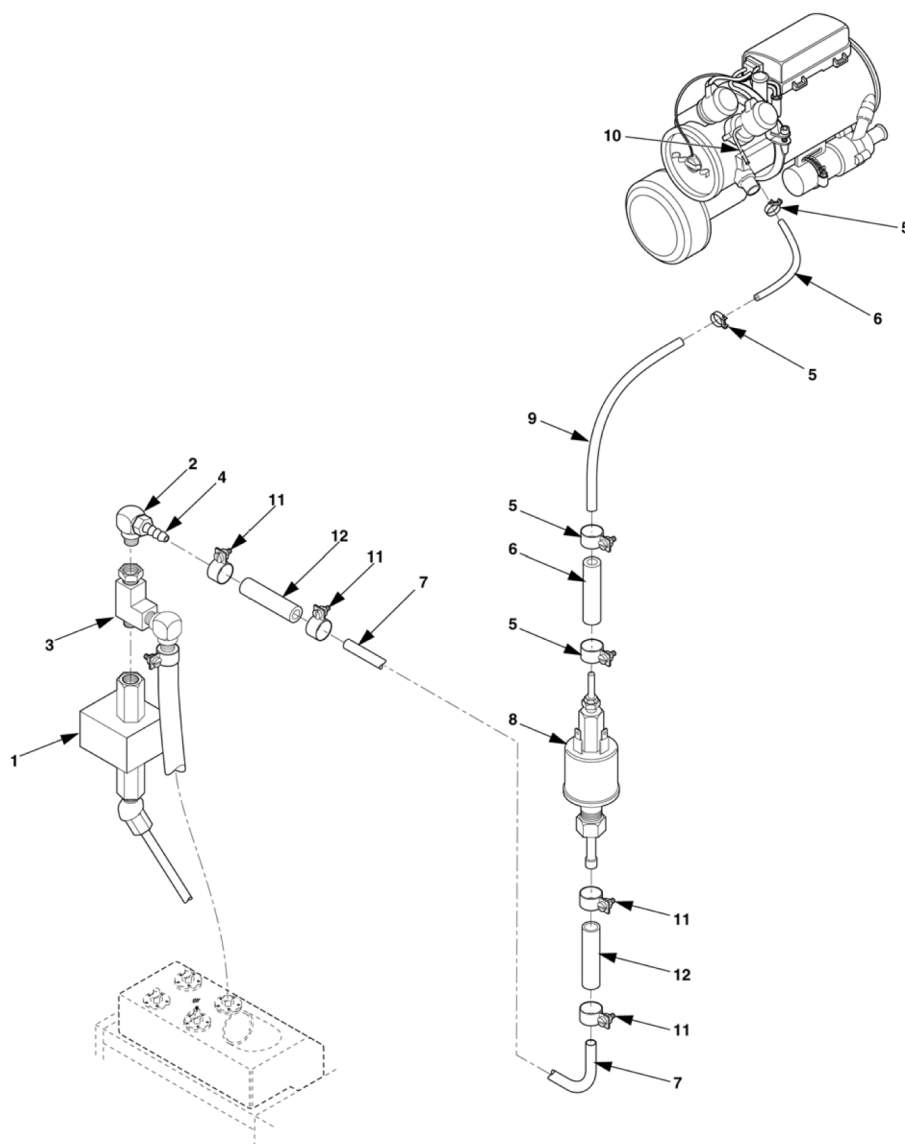


Figure 2. Winterization Kit Fuel System Assembly.

INSTALLATION – CONTINUED

11. Remove dead crank switch bracket (Figure 3, Item 4) from center bulkhead housing. Retain hardware for reinstallation.
12. Drill four 9/32 in diameter holes (Figure 3, Items 2 and 3) in center bulkhead housing (Figure 3, Item 1).
13. Install dead crank switch bracket (Figure 3, Item 4) in holes (Figure 3, Item 3) with screws, washers, and new lockwashers.

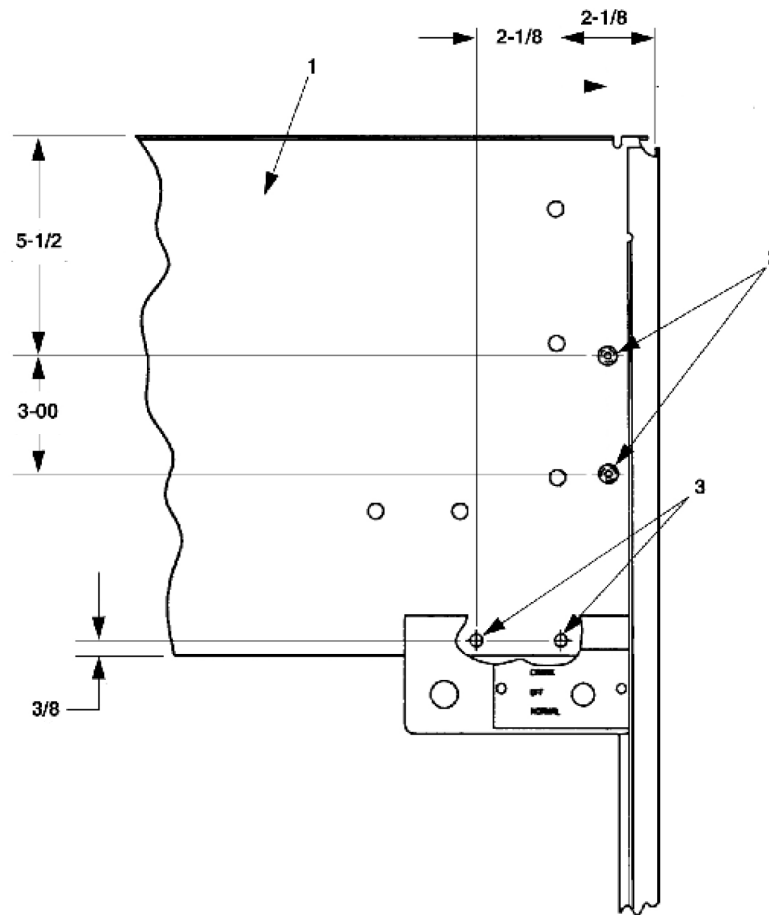


Figure 3. Winterization Kit Bulkhead Housing.

14. Loosen the heater head retaining screw (Figure 4, Item 1), part of (Figure 4, Item 2), and rotate the glow plug assembly (Figure 4, Item 3), until the right glow plug is above the coolant outlet (Figure 4, Item 4), and tighten.
15. Loosen the heater holding clamp bracket (Figure 4, Item 28), part of (Figure 4, Item 2), and rotate the "black" heater shell bracket approximately 1-1/2 in (3.81 cm) space from the heater water pump. Do not retighten the clamp.
16. Install the heater (Figure 4, Item 2) on the heater mounting plate (Figure 4, Item 5) using screws (Figure 4, Item 6), washers (Figure 4, Item 7), new lockwashers (Figure 4, Item 8), and nuts (Figure 4, Item 9).
17. Attach the heater air inlet flexible hose (Figure 4, Item 25) to the heater water pump (Figure 4, Item 26) using existing cable tie provided with heater (Figure 4, Item 2). Ensure the inlet hose (Figure 4, Item 27) does not interfere with the heater mounting bracket.

INSTALLATION – CONTINUED

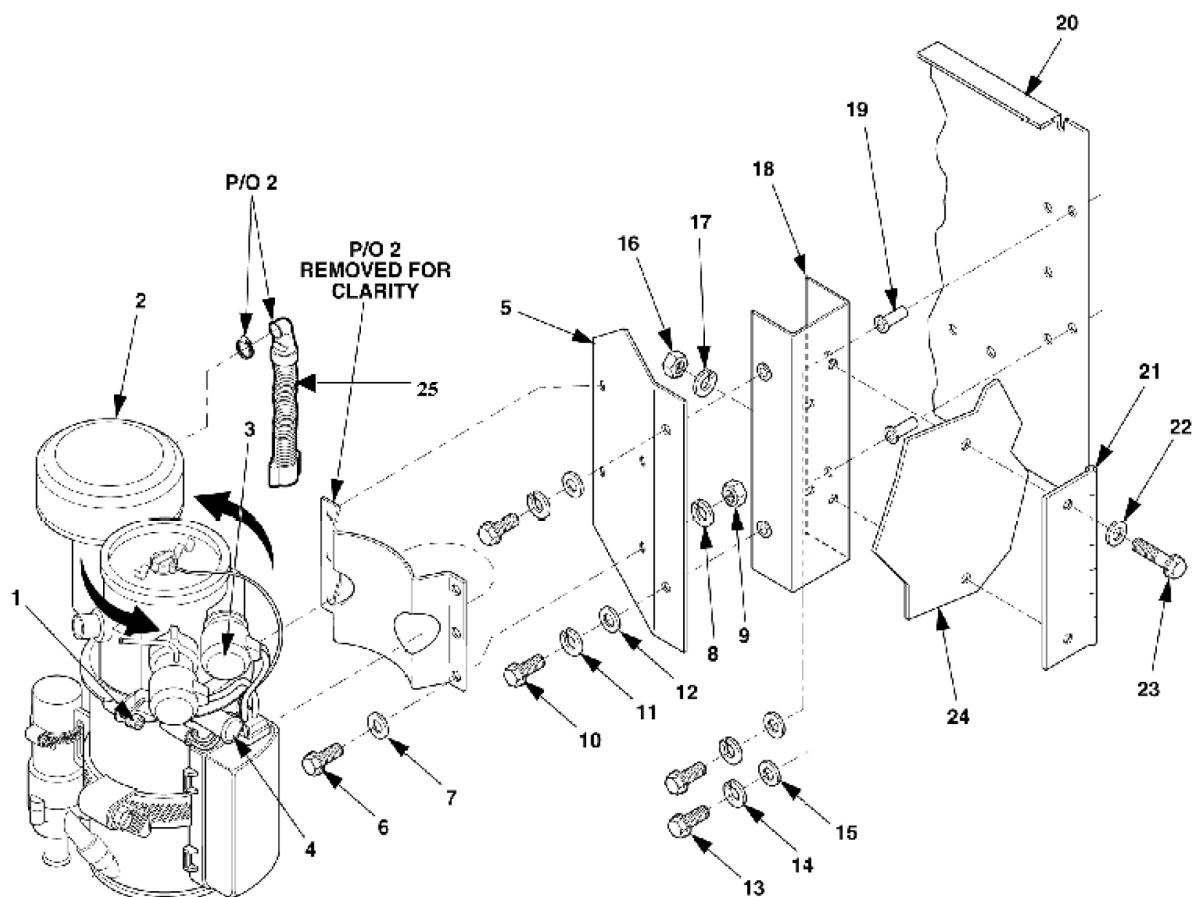


Figure 4. Winterization Kit Heater Assembly.

18. Remove the hinges (Figure 4, Item 21) and associated hardware from the generator set.
19. Install blind rivet nuts (Figure 4, Item 19) in holes on bulkhead housing (Figure 4, Item 20). See holes (Figure 3, Item 2).
20. Remove existing two screws, washers, lockwashers, and nuts from left side control box panel nearest door hinge and retain them. Discard lockwashers.
21. Install the wall mounting plate bracket (Figure 4, Item 18), on the inside of the center bulkhead housing using screws (Figure 4, Item 13), new lockwashers (Figure 4, Item 14), and washers (Figure 4, Item 15) into rivet nuts (Figure 4, Item 19).
22. Reinstall existing hardware from Step 20.
23. Install the top hinge (Figure 4, Item 21), on the outside of the center bulkhead housing (Figure 4, Item 24), using screws (Figure 4, Item 23), new lockwashers (Figure 4, Item 22), washers (Figure 4, Item 17), and nuts (Figure 4, Item 16).
24. Install the heater/mounting plate assembly (Figure 4, Item 5) to the wall mounting plate bracket (Figure 4, Item 18), using screws (Figure 4, Item 10), new lockwashers (Figure 4, Item 11), and washers (Figure 4, Item 12).
25. Retighten the heater holding clamp from Step 15 making sure the heater water pump inlet and heater air inlet hoses do not interfere with dead crank switch bracket.

INSTALLATION – CONTINUED

26. Reinstall the bottom hinge on the outside of the bulkhead housing while installing clamp and pump (Figure 5, Items 1 and 2), on inside of bulkhead housing using hardware removed in Step 18 and screw (Figure 5, Item 3).
27. Reinstall left side door to hinges with the hinges to the outside of the door using hardware and hinges removed in Step 18.

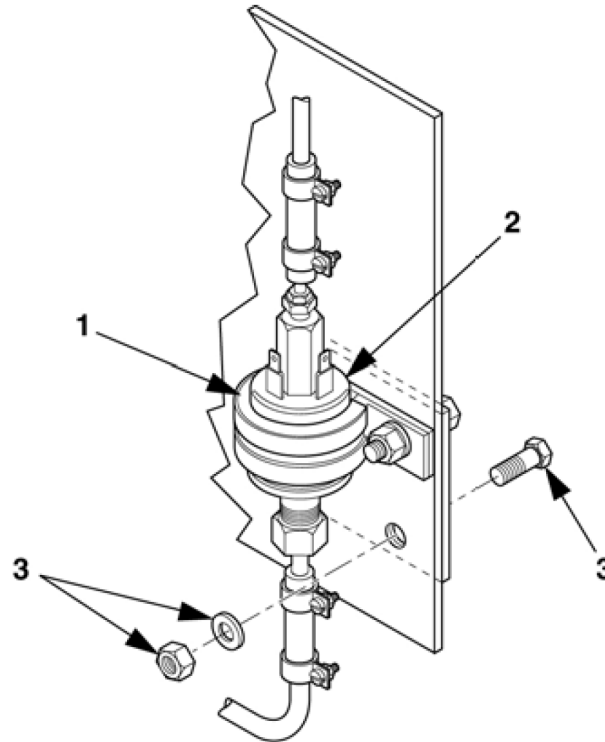


Figure 5. Winterization Kit Fuel Pump Assembly.

28. Remove the starter from the Generator Set in accordance with TM 9-2815-252-24.
29. Remove expansion plug (Figure 6, Item 1), from right side engine block. Apply retaining compound to the mating surface of expansion plug (Figure 6, Item 1). Install expansion plug (Figure 6, Item 1) flush with the engine block.
30. Reinstall the starter onto the Generator Set in accordance with TM 9-2815-252-24.

INSTALLATION – CONTINUED

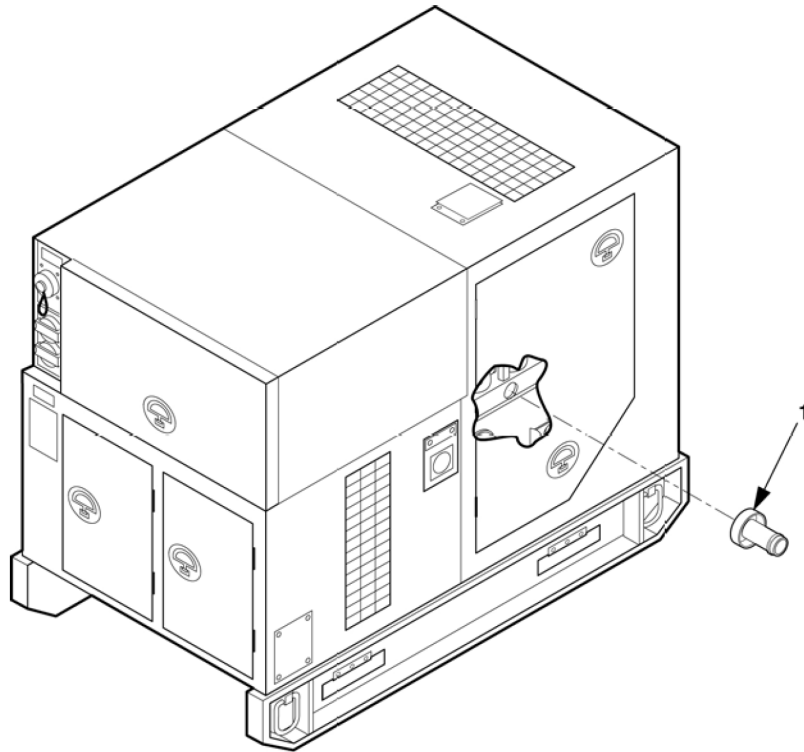


Figure 6. Winterization Kit Expansion Plug.

31. Install 90° preformed coolant hose (Figure 7, Item 5), from expansion plug (Figure 7, Item 6) to heater coolant intake using clamps (Figure 7, Item 3). Make sure to route the hose around and behind the engine. Secure with tie straps.
32. Remove cap and clamp from engine water pump. Install hose (Figure 7, Item 4) to beaded hose fitting (p/o) water pump with clamp (Figure 7, Item 3).
33. Install coolant hose (Figure 7, Item 1) to water pump adapter (Figure 7, Item 7) using clamp (Figure 7, Item 3). Attach hose (Figure 7, Item 1) to reducer (Figure 7, Item 2), attach hose (Figure 7, Item 4) to reducer (Figure 7, Item 2). Secure with clamps (Figure 7, Item 3). Cut hose (Figure 7, Item 4) for fit and secure hose (Figure 7, Item 4) to heater with clamps (Figure 7, Item 3).
34. Install heater brace (Figure 8, Item 3), by using heater brace as a template for location and mark. Drill hole, 5/16 in and mount to the inside top of the generator housing using screw (Figure 8, Item 5), washer (Figure 8, Item 6), new lockwasher (Figure 8, Item 7), and nut (Figure 8, Item 8).
35. Install thermal sleeving (Figure 8, Item 16) over exhaust hose (Figure 8, Item 15) and attach one end of exhaust hose (Figure 8, Item 15) to heater (Figure 8, Item 2) using clamp (Figure 8, Item 4). Before attaching clamp (Figure 8, Item 4), remove the screw from the clamp and insert clamp screw through heater brace (Figure 8, Item 3) and then into the clamp (Figure 8, Item 4).
36. Drill a 1-1/8 in (3.175 mm) diameter hole in rear of front housing (Figure 8, Item 1).

INSTALLATION – CONTINUED

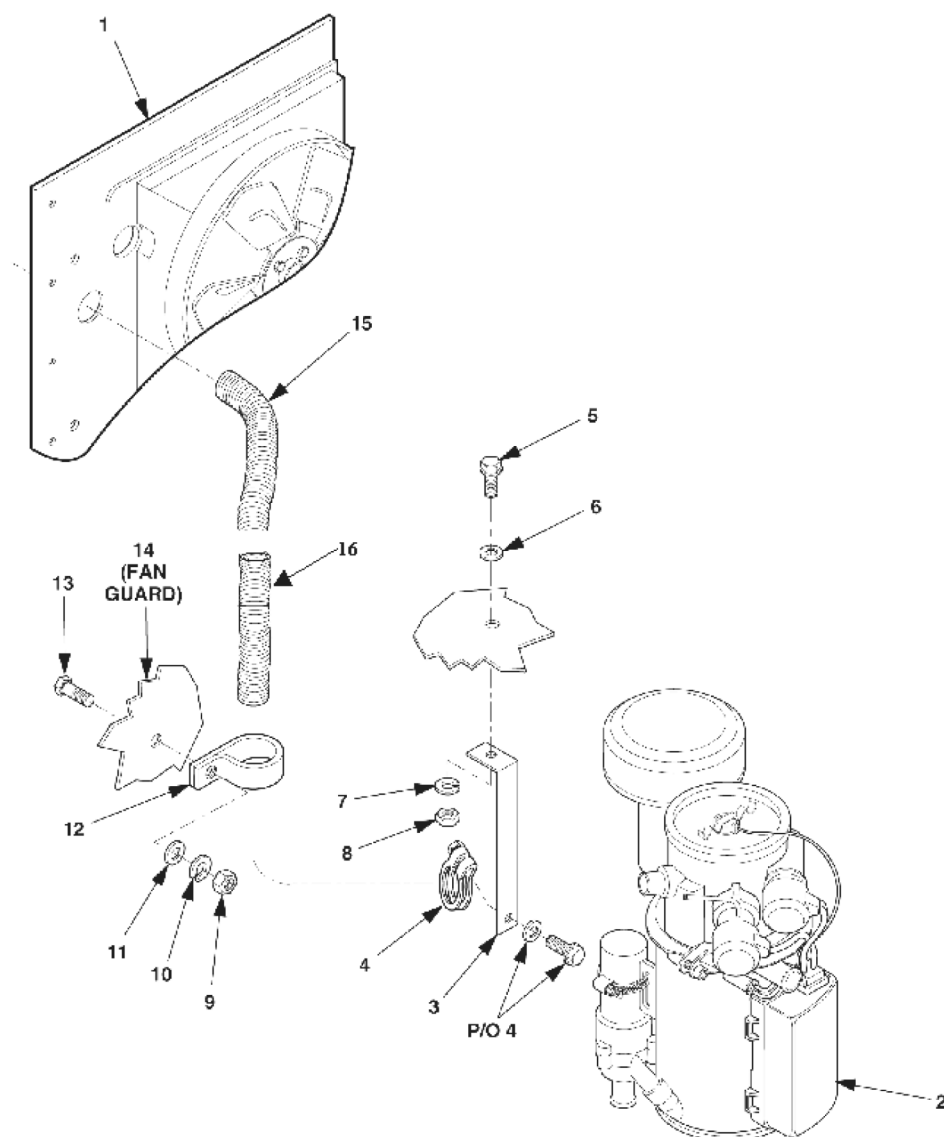


Figure 8. Winterization Kit Exhaust Hose and Heater Brace.

37. Install other end of exhaust hose (Figure 8, Item 15), into hole provided in rear of front housing (Figure 8, Item 1). Use sealant provided in kit, around hose and hole to prevent movement. Bend excess hose 90° to the right into front side of housing.
38. Drill a 7/32 in diameter hole in the left side fan guard (Figure 8, Item 14).
39. Secure exhaust hose (Figure 8, Item 15) to fan guard (Figure 8, Item 14), using clamp (Figure 8, Item 12), screw (Figure 8, Item 13), washer (Figure 8, Item 11), new lockwasher (Figure 8, Item 10), and nut (Figure 8, Item 9).

INSTALLATION – CONTINUED

NOTE

When assembling fuel component parts together or fuel component parts to tubing, Figure 9, the proper connection is a butt joint.

40. Install butt splice (Figure 2, Item 6), to heater fuel intake (Figure 2, Item 10) using clamp (Figure 2, Item 5). Bend item (Figure 2, Item 10) to approximately 90° (only if it interferes or touches the door when closed) making sure not to kink the metal tube so it pinches off the fuel supply.

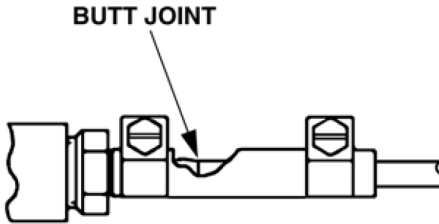


Figure 9. Butt Joint.

NOTE

Route fuel hose, tubing away from exhaust system.

41. Install butt splice (Figure 2, Item 6), to fuel pump (Figure 2, Item 8) using clamps (Figure 2, Item 5). Install tubing (Figure 2, Item 9) from butt splice (Figure 2, Item 6) on heater fuel intake to butt splice (Figure 2, Item 6) on fuel pump using clamps (Figure 2, Item 5).
42. Attach butt splices (Figure 2, Item 12) to fuel pump and to adapter (Figure 2, Item 4), using clamps (Figure 2, Item 11).
43. Install tubing (Figure 2, Item 7) between butt splices (Figure 2, Item 12) from fuel pump to adapter (Figure 2, Item 4), using clamps (Figure 2, Item 11).
44. Open storage box door.
45. Remove pins from P6-24, P6-26, and P6-25 (Figure 10).
46. Install wiring harness (Figure 10, Item 2), and include ground cable in accordance with wiring diagram. Secure with straps.

NOTE

Install fuse, (25 AMP, 32 V) if not already installed.

47. Connect fuse holder (Figure 10, Item 1) part of (Figure 10, Item 2), to (+) terminal of the slave receptacle and mount on inside of bulk head with existing hardware used to attach the slave receptacle cover chain.
48. Open control panel access door (Figure 11, Item 1).
49. Locate operating instruction plate (Figure 11, Item 2) and heater function codes plate (Figure 11, Item 3) and match and drill holes in control panel access door (Figure 11, Item 1). Plates shall be readable when door is open.

[illegible]

INSTALLATION – CONTINUED

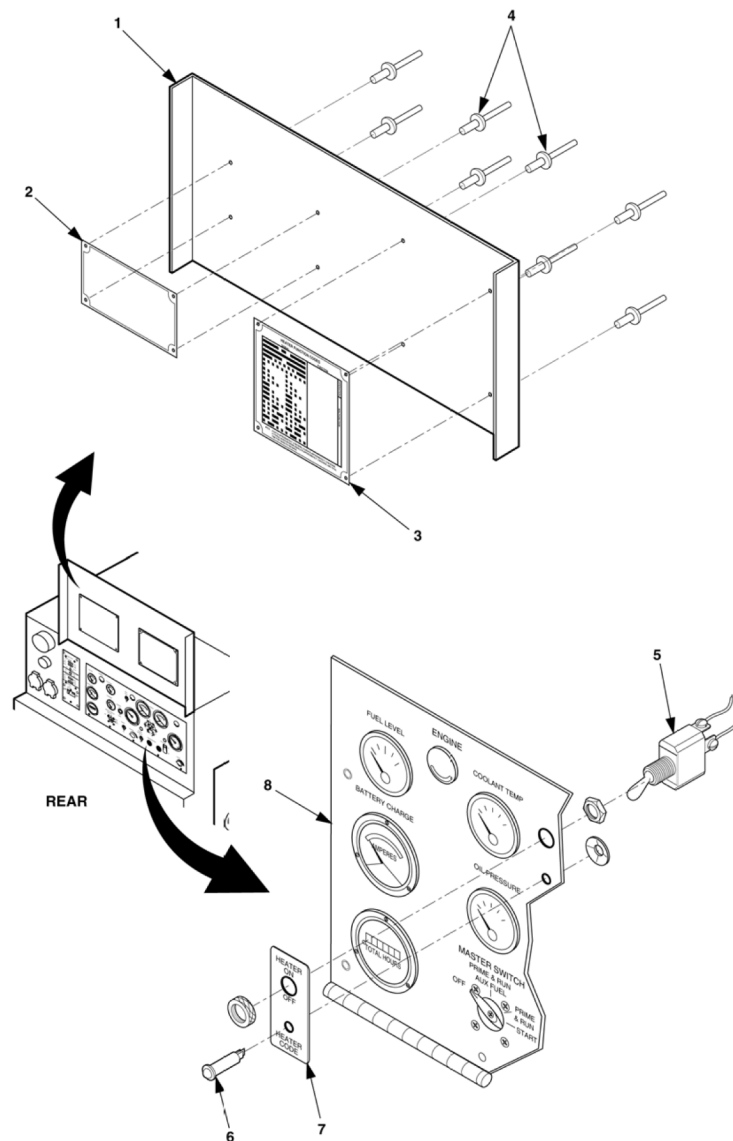


Figure 11. Winterization Kit Cover and Instrument Panel.

50. Install rivets (Figure 11, Item 4). Rivet head shall be on the outside of unit.
51. Locate heater switch label (Figure 11, Item 7) and match and drill holes in control panel (Figure 11, Item 8).
52. Install heater switch label (Figure 11, Item 7), toggle switch (Figure 11, Item 5), and indicator light (Figure 11, Item 6).
53. Referencing Figure 10, remove connector J6 from control box, then remove pins from J6-24, J6-26, and J6-25.
54. Install electrical leads, in accordance with wiring diagram. Secure leads with straps.

INSTALLATION – CONTINUED**CAUTION**

The coolant in the system shall contain the proper mixture of water and antifreeze to prevent coolant from freezing or slushing. Failure to observe this caution could cause engine damage.

55. Add coolant to proper level in the Winterization Kit.
56. Connect the positive and negative battery cables.
57. Start and run engine until the radiator thermostat has opened.
58. Using a jumper wire start the heater coolant pump only by putting positive power to pin A6 on A2 of the control unit. This will start the coolant pump only. Continue until pitch changes.
59. If necessary, top off coolant.
60. Disconnect positive lead from A6 on A2 of the control unit.
61. Double-check all hose connections for leaks.
62. With engine running, start heater. Check the heater code light, per the heater function codes plate for heater operation.
63. Turn off engine and allow heater to run until the coolant reaches temperature, at which time the heater will cycle to low heat.
64. Switch heater off.

NOTE

The water pump and combustion air blower will continue to run for several minutes

65. Locate identification plate, next to existing plates on front housing. Drill holes and install four rivets contained in kit.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**WINTERIZATION KIT, CONTROL UNIT MAINTENANCE: TESTING,
INSPECTION, REMOVAL, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

WP 0114, Initial Setup:

Materials/PartsGloves & Additional Protective Clothing
Splash-proof Goggles**Equipment Condition**Gen Set (FMC) with Win Kit Properly Installed
Gen Set Shut Down as required**Personnel Required**

91D (1)

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

TESTING

Refer to troubleshooting procedures, WP 0114, Symptom 13, 14, 15, and 16.

END OF TASK**INSPECTION**

1. Open right side engine access door.
2. Inspect control unit for loose or missing wires and damaged parts.
3. Close engine access door.

END OF TASK**REMOVAL****WARNING**

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Disconnect negative battery cable and then positive battery cable.
2. Disconnect electrical connectors.
3. Remove screws (Figure 1, Item 1), washers (Figure 1, Item 2), lockwasher (Figure 1, Item 4), nuts (Figure 1, Item 5), and control unit (Figure 1, Item 3). Discard lockwashers (Figure 1, Item 4).

END OF TASK**REPLACEMENT**

1. Perform Steps 1 through 3 of Removal.
2. Perform Steps 1 through 3 of Installation, substituting new control unit for the defective one.

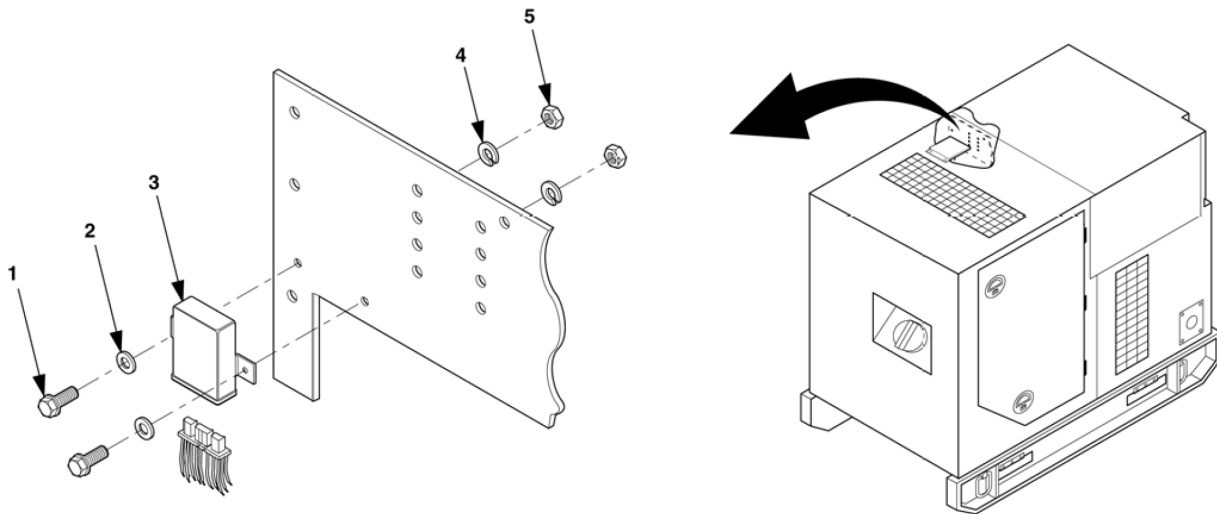


Figure 1. Winterization Kit Control Unit.

END OF TASK**INSTALLATION**

1. Install control unit (Figure 1, Item 3) with screws (Figure 1, Item 1), washers (Figure 1, Item 2), new lockwashers (Figure 1, Item 4), and nuts (Figure 1, Item 5).
2. Reconnect wiring harness to control unit.
3. Reconnect positive battery cable and then negative battery cable.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**WINTERIZATION KIT, HEATER ASSEMBLY MAINTENANCE:
INSPECTION, REMOVAL, REPAIR, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

References

WP 0118, Initial Setup:

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof Goggles
New Lockwashers
Coolant & Diesel fuel
Suitable container for catching fuel

Equipment Condition

Gen Set (FMC) with Win Kit properly installed

Special Environmental Condition

Adequately Ventilated Work Area
Coolant and Diesel fuel is toxic to eyes, skin, and respiratory tract

Personnel Required

91D (1)

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION

Inspection is limited to visual inspection of components. Check for damaged and frayed wiring.

END OF TASK**REMOVAL****WARNING**

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

REMOVAL – CONTINUED**WARNING**

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

1. Disconnect negative battery cable and then positive battery cable.
2. Drain coolant system.
3. Disconnect fuel line (Figure 1, Item 1) from heater and drain any fuel from hose into a suitable container.
4. Disconnect wiring harness connector (WP 0118, Figure 10, Item A1) from heater.
5. Loosen screw clamps (Figure 1, Item 3) and remove exhaust hose (Figure 1, Item 13) from heater (Figure 1, Item 2).
6. Position a suitable container under heater to catch coolant from hoses, and loosen screw clamps (Figure 1, Item 11) to disconnect coolant inlet hose (Figure 1, Item 12) and outlet hose (Figure 1, Item 10) from heater (Figure 1, Item 2).
7. Remove screws (Figure 1, Item 9), lockwashers (Figure 1, Item 8), washers (Figure 1, Item 7), and heater (Figure 1, Item 2) with mounting plate (Figure 1, Item 5) from mounting bracket (Figure 1, Item 6). Loosen heater brace from top cover. Discard lockwashers (Figure 1, Item 8).

END OF TASK**REPAIR**

Repair of the Heater Assembly is limited to the replacement of the igniter/glow plug assembly, resistor, and the heater pump.

END OF TASK**REPLACEMENT**

1. Perform removal steps.
2. Perform installation steps substituting new heater assembly for the defective one.

END OF TASK**INSTALLATION**

1. Install heater (Figure 1, Item 2) with attached mounting plate (Figure 1, Item 5) on mounting bracket (Figure 1, Item 6). Install washers (Figure 1, Item 7), new lockwashers (Figure 1, Item 8), and screws (Figure 1, Item 9) to secure heater (Figure 1, Item 2).
2. Connect coolant inlet hose (Figure 1, Item 12) and outlet hose (Figure 1, Item 10) to heater (Figure 1, Item 2), using screw clamps (Figure 1, Item 11). Top off radiator to replace any coolant lost in removing hoses.
3. Attach exhaust hose (Figure 1, Item 13) to heater unit (Figure 1, Item 2) using screw clamp (Figure 1, Item 3) connected to heater brace, and tighten.
4. Connect wiring harness connector (WP 0118, Figure 10, Item A1) to the heater (Figure 1, Item 2).
5. Connect fuel line (Figure 1, Item 1) to heater assembly (Figure 1, Item 2).
6. Top off coolant system.
7. Reconnect positive battery cable and then negative battery cable.

INSTALLATION – CONTINUED

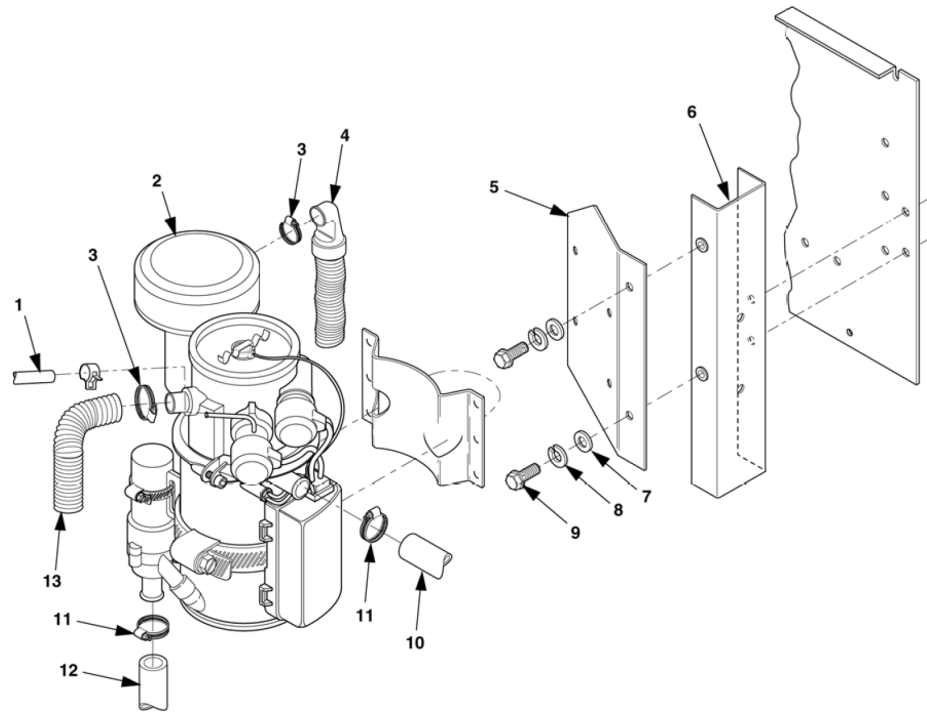


Figure 1. Winterization Kit Heater Assembly.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, FUEL PUMP MAINTENANCE: TESTING, REMOVAL, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof Goggles
New Lockwashers
Diesel fuel
Suitable container for catching fuel
New fuel pump

Equipment Condition

Gen Set (FMC) with Win Kit properly installed

Special Environmental Condition

Adequately Ventilated Work Area
Diesel fuel is toxic to eyes, skin, and respiratory tract

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

TESTING

1. Disconnect fuel line at heater assembly.

WARNING

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

2. Remove fuel line (Figure 1, Item 6) from output end of fuel pump (Figure 1, Item 2) and place into container suitable for catching fuel.
3. Apply 24 VDC to electrical input of pump. Pump should hum. Fuel will then start flowing into the container.

END OF TASK**REMOVAL****WARNING**

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL – CONTINUED**WARNING**

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

WARNING

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

1. Disconnect negative battery cable and then positive battery cable.
2. Disconnect electrical leads (Figure 1, Item 1) from connector on fuel pump (Figure 1, Item 2).
3. Loosen screw clamp (Figure 1, Item 3) to disconnect fuel line (Figure 1, Item 4) and butt splice (Figure 1, Item 5) from input end of fuel pump (Figure 1, Item 2). Drain any fuel from line into a suitable container.

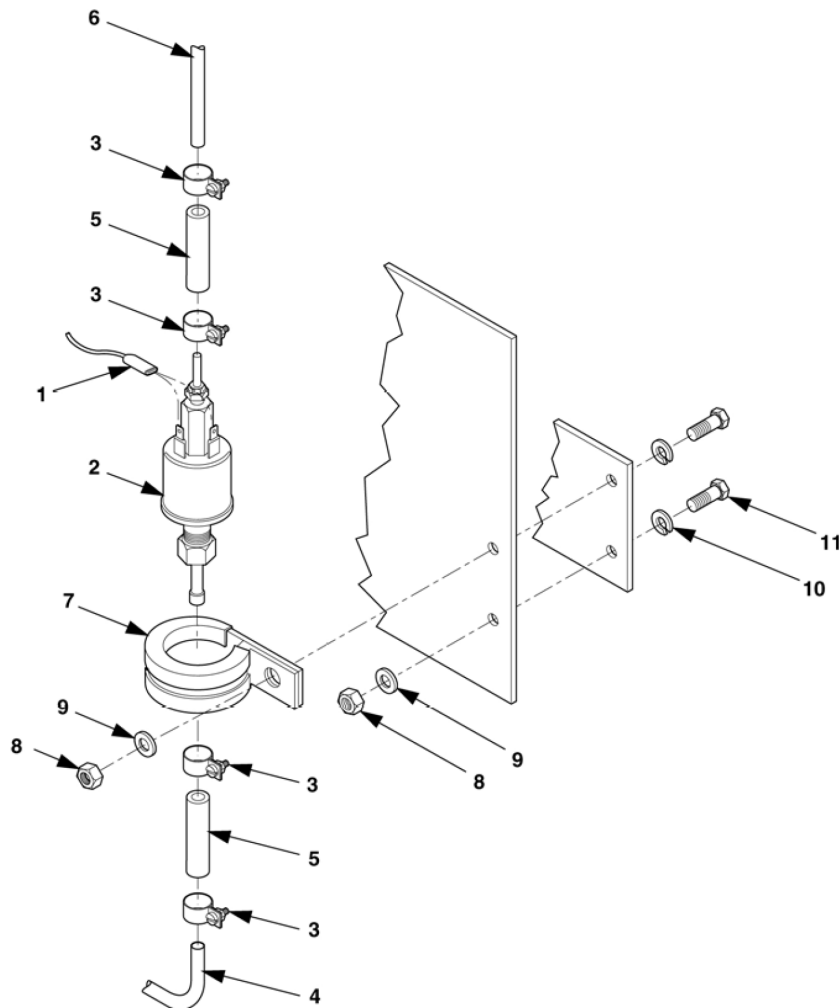


Figure 1. Winterization Kit Fuel Pump.

4. Loosen screw clamp (Figure 1, Item 3) to disconnect butt splice (Figure 1, Item 5) and fuel line (Figure 1, Item 6) from output end of fuel pump (Figure 1, Item 2). Drain any fuel from line into a suitable container.

REMOVAL – CONTINUED

5. Remove nut (Figure 1, Item 8), washer (Figure 1, Item 9), lockwasher (Figure 1, Item 10), and screw (Figure 1, Item 11). Discard lockwasher (Figure 1, Item 9).
6. Remove fuel pump (Figure 1, Item 2) from clamp (Figure 1, Item 7).

END OF TASK**REPLACEMENT**

1. Perform removal steps.
2. Perform installation steps substituting new fuel pump for the defective one.

END OF TASK**INSTALLATION**

1. Install new fuel pump (Figure 1, Item 2) and clamp (Figure 1, Item 7) and secure with screw (Figure 1, Item 11), new lockwasher (Figure 1, Item 10), washer (Figure 1, Item 9), and nut (Figure 1, Item 8).
2. Install butt splice (Figure 1, Item 5) and fuel line (Figure 1, Item 6) on outlet end of fuel pump (Figure 1, Item 2) and secure with screw clamps (Figure 1, Item 3).
3. Install fuel line (Figure 1, Item 4) and butt splice (Figure 1, Item 5) on inlet end of fuel pump (Figure 1, Item 2) and secure with screw clamps (Figure 1, Item 3).
4. Plug in electrical leads (Figure 1, Item 1) at connector on fuel pump (Figure 1, Item 2).
5. Reconnect positive battery cable and then negative battery cable.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**WINTERIZATION KIT, FUEL LINE MAINTENANCE:
INSPECTION, REMOVAL, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof Goggles
New Lockwashers
Diesel fuel
Suitable container for catching fuel

Equipment Condition

Gen Set (FMC) with Win Kit properly installed

Special Environmental Condition

Adequately Ventilated Work Area
Diesel fuel is toxic to eyes, skin, and respiratory tract

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION

Perform a visual inspection for deterioration, leakage, dry rot, etc.

END OF TASK**REMOVAL****WARNING**

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

1. Loosen screw clamps (Figure 1, Item 1), to remove butt splices (Figure 1, Item 6) and fuel line (Figure 1, Item 2) between primary pump (Figure 1, Item 3), and fuel pump (Figure 1, Item 4). Drain any fuel from line into a suitable container.
2. Loosen screw clamps (Figure 1, Item 5) to remove butt splices (Figure 1, Item 9) and fuel line (Figure 1, Item 7) between fuel pump (Figure 1, Item 4) and heater (Figure 1, Item 8).

END OF TASK**REPLACEMENT**

1. Perform removal steps.
2. Perform installation steps substituting new fuel line for the defective one.

END OF TASK**INSTALLATION****NOTE**

Ensure that fuel line is routed away from the engine and heater exhaust.

1. Install a new fuel line (Figure 1, Item 2) and butt splices (Figure 1, Item 6) between primary fuel pump (Figure 1, Item 3) and fuel pump (Figure 1, Item 4), securing with screw clamps (Figure 1, Item 1).
2. Install a new fuel line (Figure 1, Item 7) and butt splices (Figure 1, Item 9) between fuel pump (Figure 1, Item 4) and heater (Figure 1, Item 8), securing with screw clamps (Figure 1, Item 5).

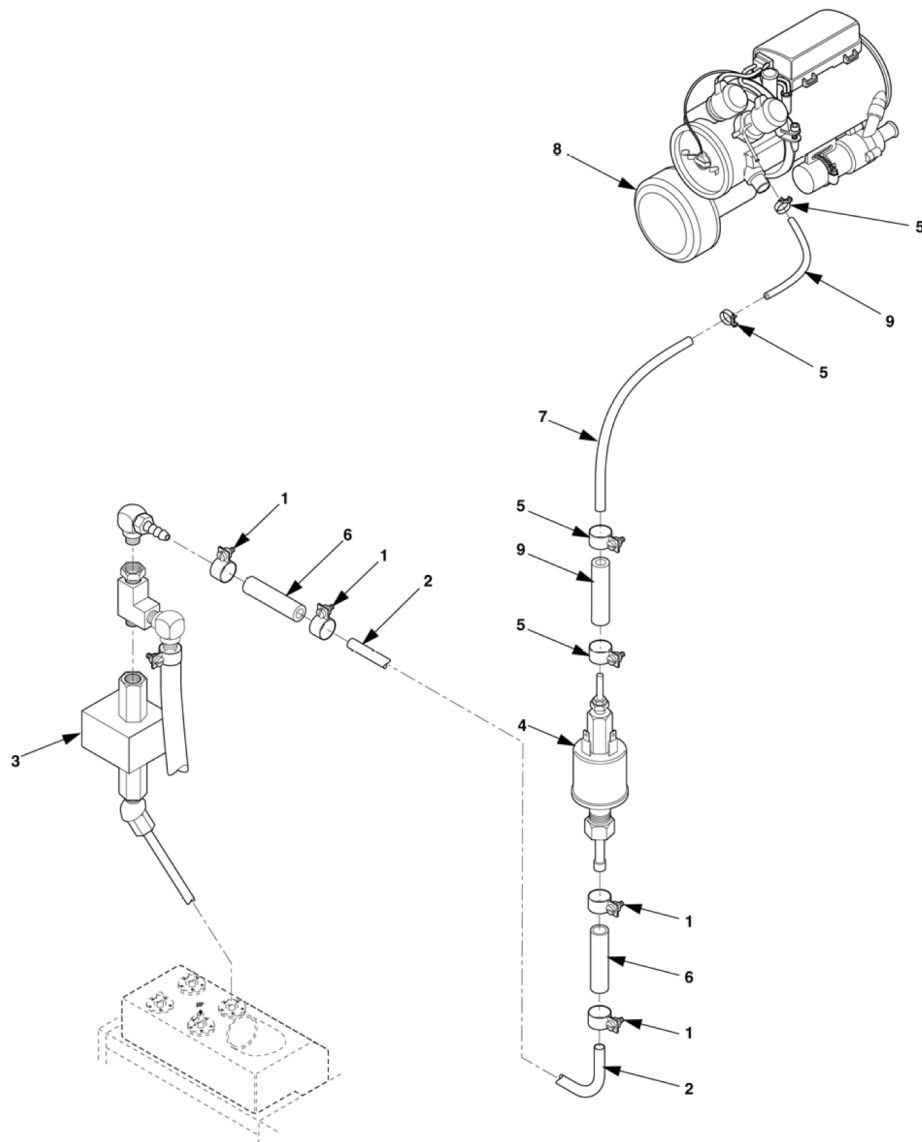


Figure 1. Winterization Kit Fuel Line.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**HEATER ATTACHMENT MAINTENANCE: REMOVAL, INSPECTION, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof Goggles
New Lockwashers
Diesel fuel
Suitable container for catching fuel

Equipment Condition

Gen Set (FMC) with Win Kit properly installed
Gen Set Shut Down as required
Engine Cool

REMOVAL**WARNING**

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

1. Turn heater and generator off.
2. Open left and right access doors. Disconnect negative battery cable from the right battery and then disconnect positive battery cable from the left battery.
3. Support heater. Remove screws (Figure 1, Items 1, 3, and 4), washers (Figure 1, Items 2, 7, and 8), nuts (11), lockwashers (Figure 1, Items 5, 6, and 9) and heater from heater-mounting brace (Figure 1, Item 10), then from wall-mounting bracket (Figure 1, Item 12), from generator housing (Figure 1, Item 14). Discard lockwashers (Figure 1, Items 5, 6, and 9).

END OF TASK**INSPECTION**

Inspect all hardware (Figure 1, Items 1 through 13) for damage and replace as required.

END OF TASK

INSTALLATION

1. Install wall-mounting bracket (Figure 1, Item 12) with screws (Figure 1, Item 4), new lockwashers (Figure 1, Item 6) and washers (Figure 1, Item 8) to generator housing (Figure 1, Item 14).
2. Install heater to heater-mounting brace (Figure 1, Item 10) with screws (Figure 1, Item 1), washers (Figure 1, Item 2), new lockwashers (Figure 1, Item 9) and nuts (Figure 1, Item 11).
3. Install heater-mounting brace (Figure 1, Item 10) to wall-mounting bracket (Figure 1, Item 12) with screws (Figure 1, Item 3), new lockwashers (Figure 1, Item 5), and washers (Figure 1, Item 7).
4. Reconnect batteries and close access doors.

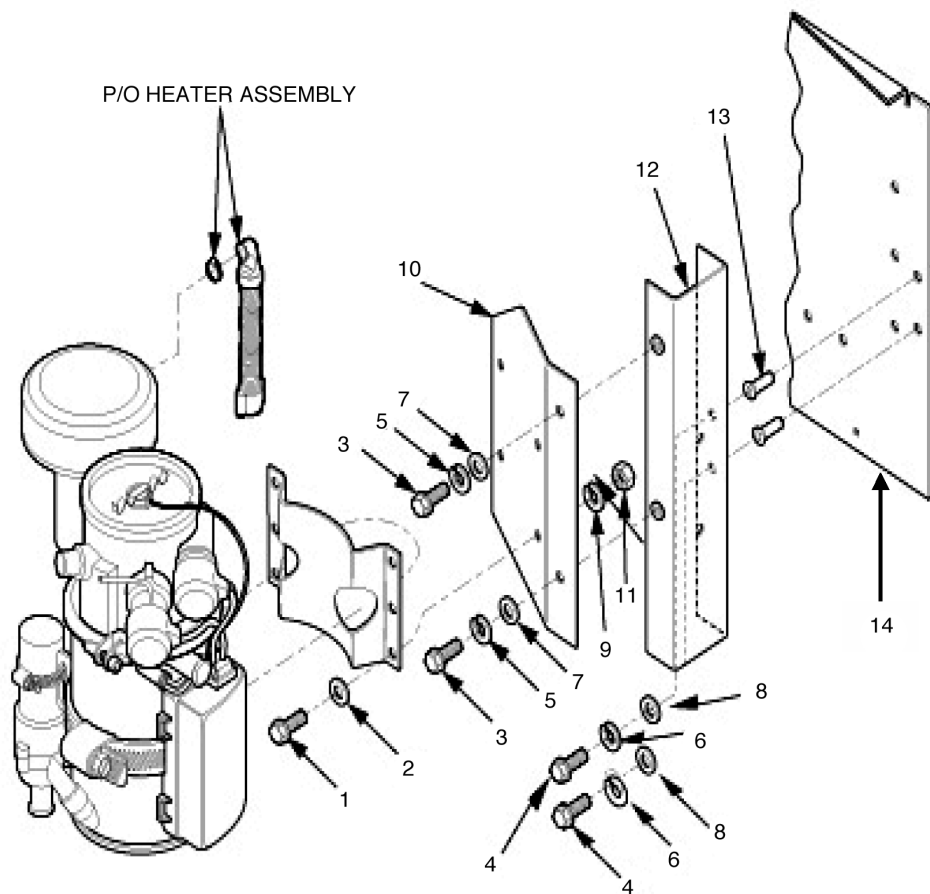


Figure 1. Winterization Kit Heater Attachment.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, HEATER SWITCH/HEATER SWITCH PLATE/INDICATOR LIGHT
MAINTENANCE: INSTALLATION, INSPECTION, TESTING, REMOVAL, REPLACEMENT**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment ConditionGen Set (FMC) with Win Kit properly installed

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

INSTALLATION**Heater Switch Plate**

1. Using the heater switch plate (Figure 1, Item 1) as a guide, drill a 5/16 in and a 1/2 in hole in control panel (Figure 1, Item 2).
2. Align and attach heater switch plate, using blind rivets.

END OF TASK**INSPECTION****Heater Switch Plate**

Inspection is limited to visual inspection of components. Check for damaged and frayed wiring.

END OF TASK**TESTING****Heater Switch**

1. Disconnect lead from terminal of switch (Figure 1, Item 1) and use multimeter to measure for continuity across switch terminals with switch in ON position. With switch in OFF position, there should be an open circuit.
2. If readings are not as above, replace switch.

END OF TASK

REMOVAL

Heater Switch

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

1. Disconnect negative battery cable and then positive battery cable.
2. Open control box door and release control panel by turning two fasteners and carefully lowering control panel.
3. At generator control panel (Figure 1, Item 2), tag and disconnect all electrical leads to switch (Figure 1, Item 1).
4. Remove knurled nut (Figure 1, Item 3) and mounting nut (Figure 1, Item 4) from control panel (Figure 1, Item 2).

END OF TASK

REPLACEMENT

Heater Switch

1. Perform Steps 1 through 4 of Removal - Heater Switch.
2. Perform Steps 1 through 3 of Installation - Heater Switch, substituting new heater switch for the defective one.

END OF TASK

INSTALLATION

Heater Switch

1. Install switch (Figure 1, Item 1), mounting nut (Figure 1, Item 4), knurled nut (Figure 1, Item 3), and reconnect electrical leads to switch (Figure 1, Item 1).
2. Raise and secure control panel (Figure 1, Item 2) and close control box door.
3. Reconnect positive battery cable and then negative battery cable.

END OF TASK

INSPECTION

Indicator Light

Inspection is limited to visual inspection of components. Check for defects.

END OF TASK

INSTALLATION

Indicator Light

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

1. Disconnect negative battery cable and then positive battery cable.
2. Open control box door and release control panel by turning two fasteners and carefully lowering control panel.
3. At generator control panel (Figure 1, Item 2), tag and disconnect all electrical leads to switch (Figure 1, Item 1).
4. Install indicator light (Figure 1, Item 5) with push on nut (Figure 1, Item 6).

END OF TASK

REMOVAL

Indicator Light

Remove push on nut (Figure 1, Item 6) from indicator light (Figure 1, Item 5).

END OF TASK

REPLACEMENT

Indicator Light

1. Complete Steps 1 through 4 of Installation - Indicator Light.
2. Complete Removal steps of Indicator Light.
3. Replace defective indicator light with new indicator light.

REPLACEMENT – CONTINUED

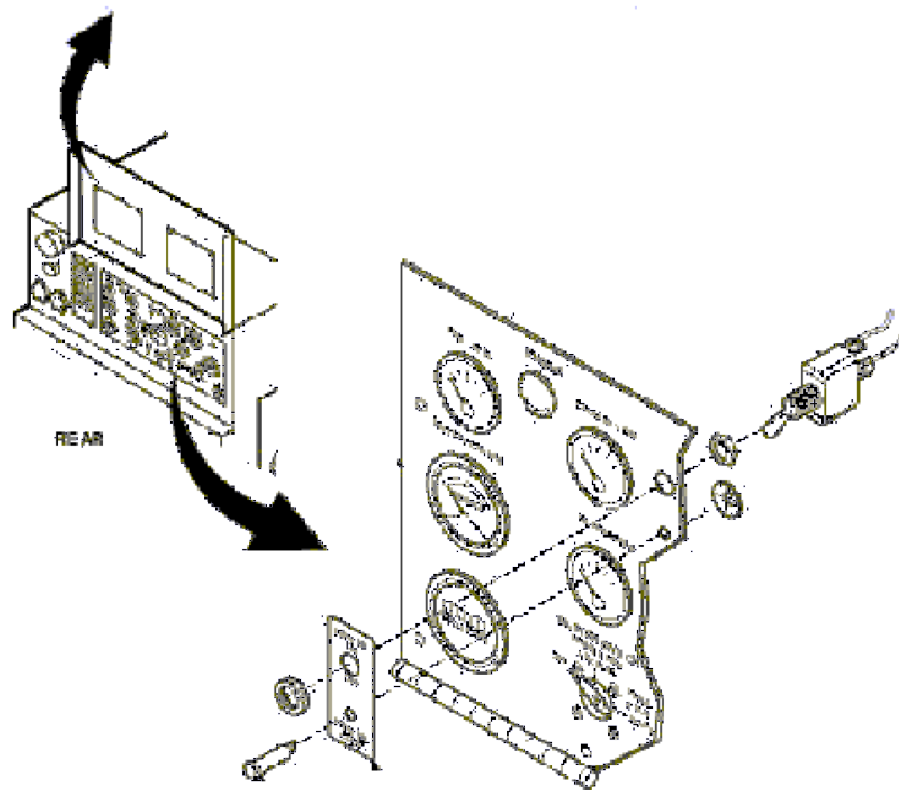


Figure 1. Winterization Kit Heater Switch/Heater Switch Plate/Indicator Light.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, COOLANT HOSE MAINTENANCE:
INSPECTION, REMOVAL, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGloves & Additional Protective Clothing
Goggles Splash-proof**References**TM-750-254

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION

Inspection is limited to visual inspection of components. Check for leaks and cuts.

END OF TASK**REMOVAL****WARNING**

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

1. Drain coolant (see TM 750-254).
2. Loosen screw clamps (Figure 1, Item 1) to disconnect either or both coolant hoses, inlet (Figure 1, Item 2) or outlet (Figure 1, Item 3) from the heater. Drain any coolant from the hoses into a suitable container.

END OF TASK**REPLACEMENT**

1. Perform Removal Steps above.
2. Perform Installation Steps below, substituting new coolant hose(s) for defective one(s).

END OF TASK

INSTALLATION

1. Install new hose (Figure 1, Items 2 and/or 3) securing with screw clamps (Figure 1, Item 1).
2. Top off radiator coolant level to replace coolant lost in hose removal.

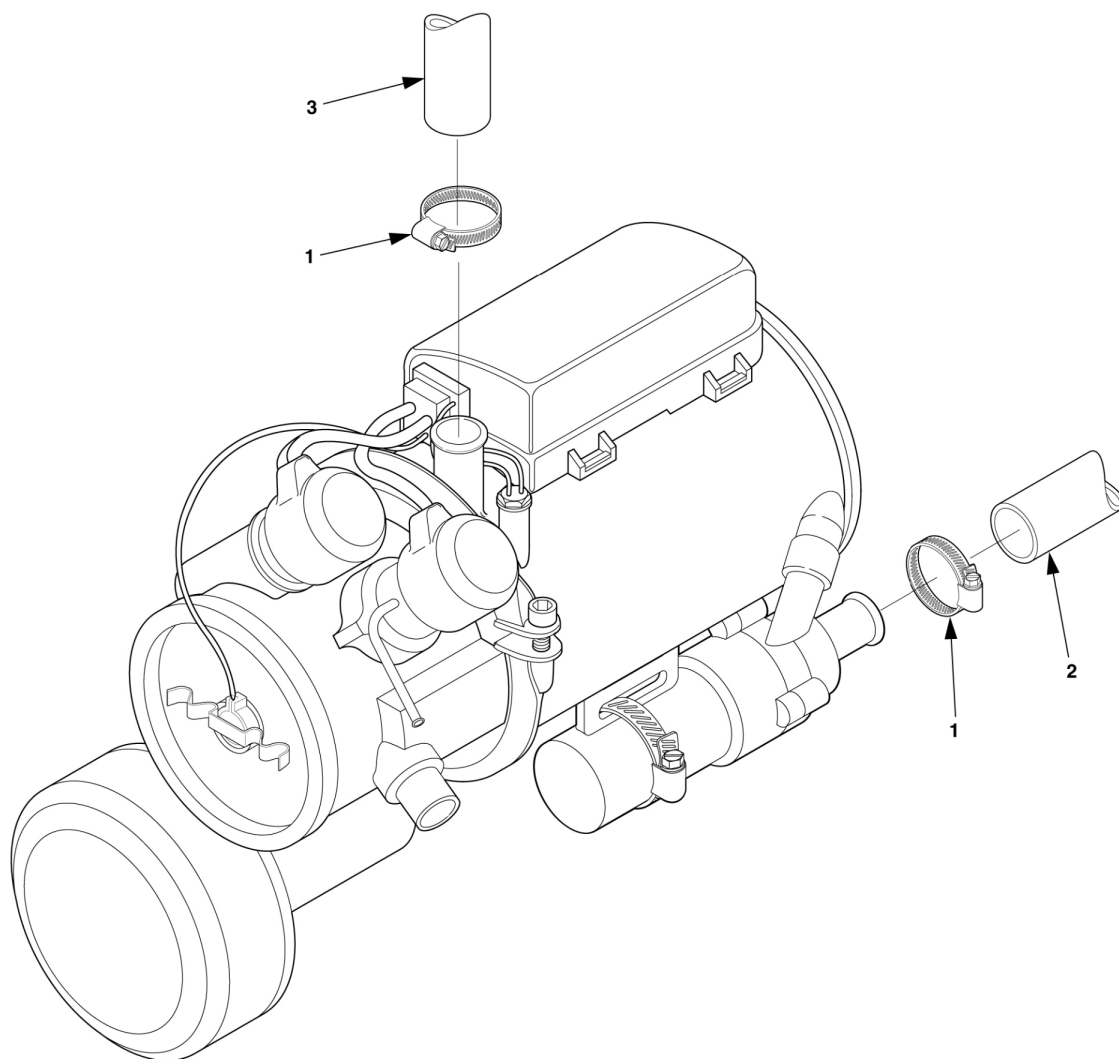


Figure 1. Winterization Kit Coolant Hose.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, AIR INLET AND EXHAUST HOSE MAINTENANCE:
INSPECTION, REMOVAL, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGloves & Additional Protective Clothing
New Lockwashers**Equipment Condition**Gen Set (FMC) with Win Kit properly installed
Gen Set Shut Down as required
Engine Cool

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION

Inspection is limited to visual inspection of components. Check for cuts, air leaks, and crushed hoses.

END OF TASK**REMOVAL****WARNING**

Muffler and flex hoses can get very hot. Allow them to cool before touching them. Failure to comply with this warning can cause severe burns and injury to personnel.

1. Loosen screw clamp (Figure 1, Item 1) to remove air inlet hose (Figure 1, Item 2) from heater (Figure 1, Item 3).
2. Loosen screw clamp (Figure 1, Item 4) to remove air exhaust hose (Figure 1, Item 5) and from heater exhaust port (Figure 1, Item 13).
3. Remove nut (Figure 1, Item 6), lockwasher (Figure 1, Item 7), washer (Figure 1, Item 8), screw (Figure 1, Item 9), and clamp (Figure 1, Item 10) from fan guard (Figure 1, Item 11). Discard lockwasher (Figure 1, Item 7).
4. Remove sealant from around air exhaust hose (Figure 1, Item 5) at hole through fan shroud (Figure 1, Item 12).
5. Remove thermal sleeving from exhaust hose (Figure 1, Item 5) and retain.

END OF TASK**REPLACEMENT**

1. Perform Removal Steps.

REPLACEMENT – CONTINUED

2. Perform Installation steps substituting new air inlet and exhaust hose for the defective one.

END OF TASK**INSTALLATION**

1. Reinstall thermal sleeving on exhaust hose (Figure 1, Item 5).
2. Attach air exhaust hose (Figure 1, Item 5) through hole in fan shroud (Figure 1, Item 12), and slightly bend end of exhaust hose (Figure 1, Item 5), 90° to the right.
3. Attach air exhaust hose (Figure 1, Item 5) to heater exhaust port (Figure 1, Item 13) with screw clamp (Figure 1, Item 4) and brace.
4. Attach exhaust clamp (Figure 1, Item 10) to air exhaust hose (Figure 1, Item 5) and attach to fan guard (Figure 1, Item 11) using screw (Figure 1, Item 9), washer (Figure 1, Item 8), new lockwasher (Figure 1, Item 7) and nut (Figure 1, Item 6).
5. Put sealant around air exhaust hose (Figure 1, Item 5) at hole in fan shroud (Figure 1, Item 12) and fill in completely.
6. Attach air inlet hose (Figure 1, Item 2) to heater (Figure 1, Item 3) with screw clamp (Figure 1, Item 1).

INSTALLATION – CONTINUED

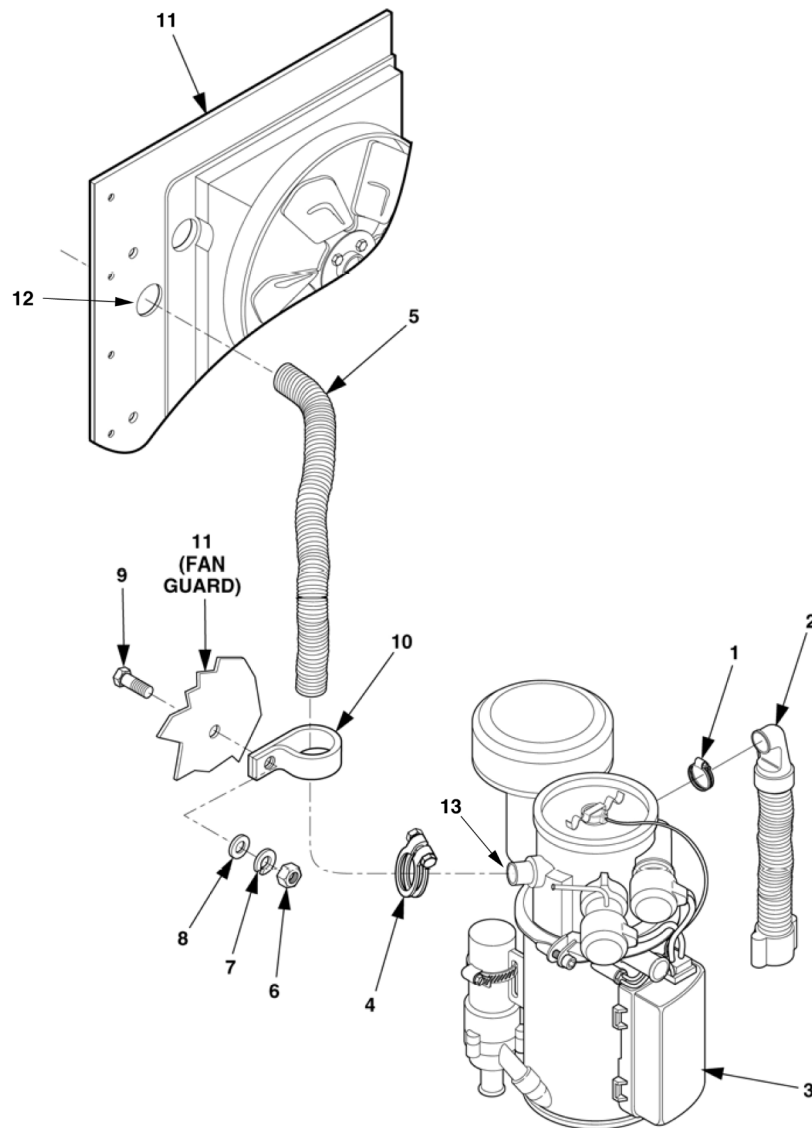


Figure 1. Winterization Kit Air Inlet and Exhaust Hose.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, WIRING HARNESS MAINTENANCE: INSPECTION,
TESTING, REMOVAL, REPAIR, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment ConditionGen Set (FMC) with Win Kit properly installed

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

WARNING

High voltage is produced when this generator set is in operation. Shutdown generator set and make sure it is free of any power source before attempting any repair or maintenance on the set, or when connecting or disconnecting load cables. Failure to comply with this warning can cause injury or death to personnel.

INSPECTION

Inspection is limited to visual inspection of components. Check for damaged and frayed wiring.

END OF TASK**TESTING**

Test wiring for continuity. Replace any open or broken wires or connectors.

END OF TASK**REMOVAL**

1. Prior to removal, refer to Figure 1 and tag all leads on wiring harness.
2. Disconnect all leads and plugs. Remove wiring harness.

END OF TASK**REPAIR**

Repair consists of replacing wires, connectors, and terminals. Follow standard shop practice when performing all repairs.

END OF TASK

REPLACEMENT

1. Perform Removal Steps above.
2. Perform Installation Steps below, substituting a repaired or new wiring harness for the defective one.

END OF TASK**INSTALLATION**

1. Position wiring harness in place.
2. Refer to Figure 1 and connect leads and plugs.

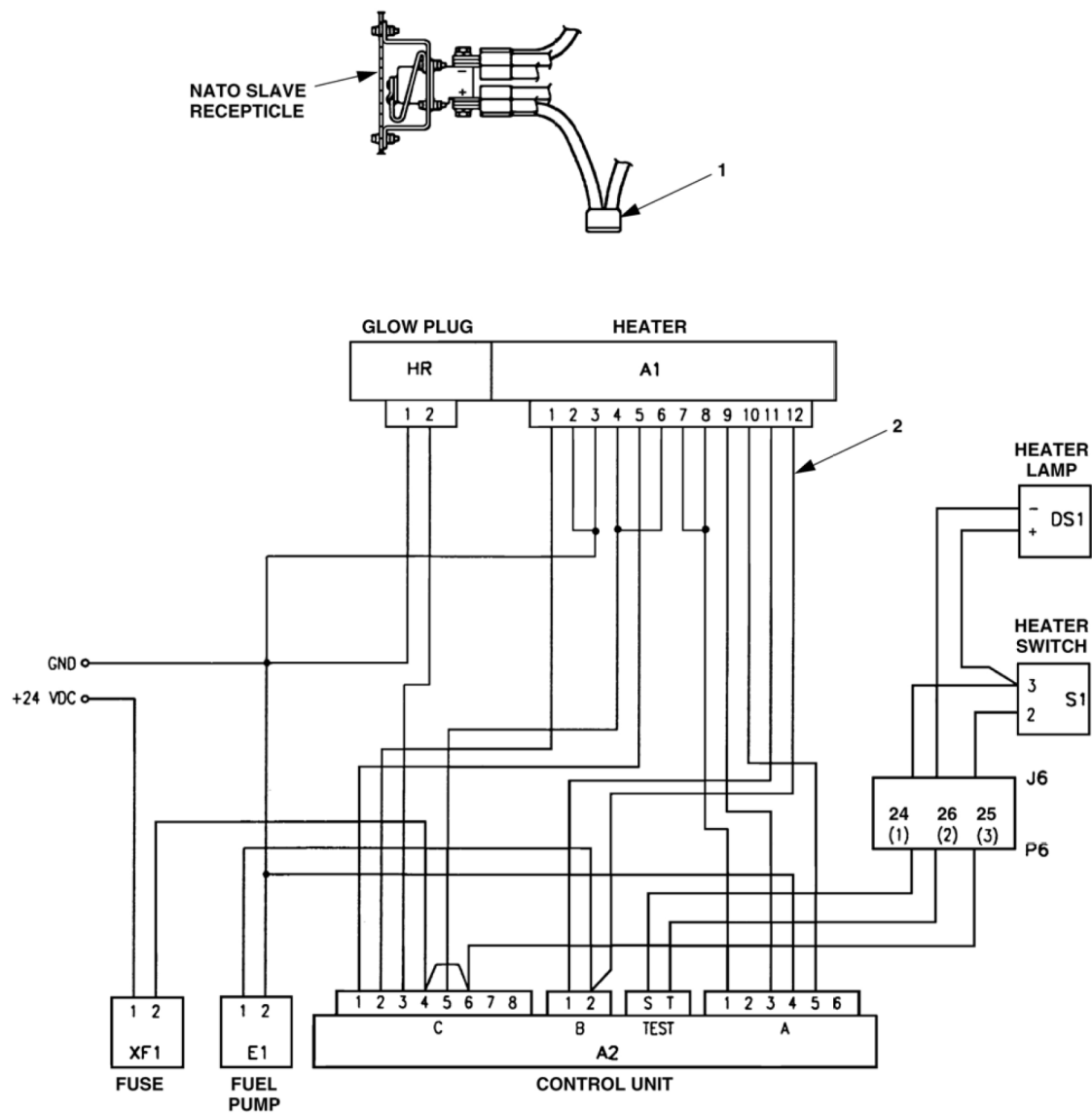


Figure 1. Winterization Kit Wiring Harness.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE
WINTERIZATION KIT, IGNITER/GLOW PLUG AND RESISTOR MAINTENANCE: TESTING, REPLACEMENT

INITIAL SETUP:**Test Equipment**

Multimeter

Personnel Required

91D (1)

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Equipment Condition

Gen Set (FMC) with Win Kit properly installed

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

TESTING

1. Disconnect negative battery cable, and then disconnect positive battery cable.
2. Remove caps (Figure 1, Item 5) from igniter/glow plug (Figure 1, Item 4) and resistor (Figure 1, Item 1).
3. Loosen hex nuts (Figure 1, Item 2) and disconnect cable (Figure 1, Item 3) from igniter/glow plug (Figure 1, Item 4) and resistor (Figure 1, Item 1).
4. Check continuity between igniter/glow plug (Figure 1, Item 4) and ground and the resistor (Figure 1, Item 1) and ground.
5. Reconnect cable (Figure 1, Item 3) and tighten hex nuts (Figure 1, Item 2) on igniter/glow plug (Figure 1, Item 4) and resistor (Figure 1, Item 1).
6. Replace caps (Figure 1, Item 5) on igniter/glow plug (Figure 1, Item 4) and resistor (Figure 1, Item 1).
7. Reconnect positive battery cable, and then reconnect negative battery cable.

END OF TASK**REPLACEMENT**

1. Disconnect negative battery cable, and then disconnect positive battery cable.
2. Remove caps (Figure 1, Item 5) from igniter/glow plug (Figure 1, Item 4) and/or resistor (Figure 1, Item 1). Loosen hex nuts (Figure 1, Item 2) on igniter/glow plug (Figure 1, Item 4) and/or resistor (Figure 1, Item 1). Remove cable (Figure 1, Item 3).
3. Unscrew igniter/glow plug (Figure 1, Item 4) and/or resistor (Figure 1, Item 1), as required, and remove them. Use an angled hook to clean the igniter/glow plug hole and resistor hole.
4. Install igniter/glow plug (Figure 1, Item 4) in igniter/glow plug hole and/or resistor (Figure 1, Item 1).

REPLACEMENT – CONTINUED

5. Install cable (Figure 1, Item 3), hex nuts (Figure 1, Item 2), and caps (Figure 1, Item 5).
6. Reconnect positive battery cable, and then reconnect negative battery cable.

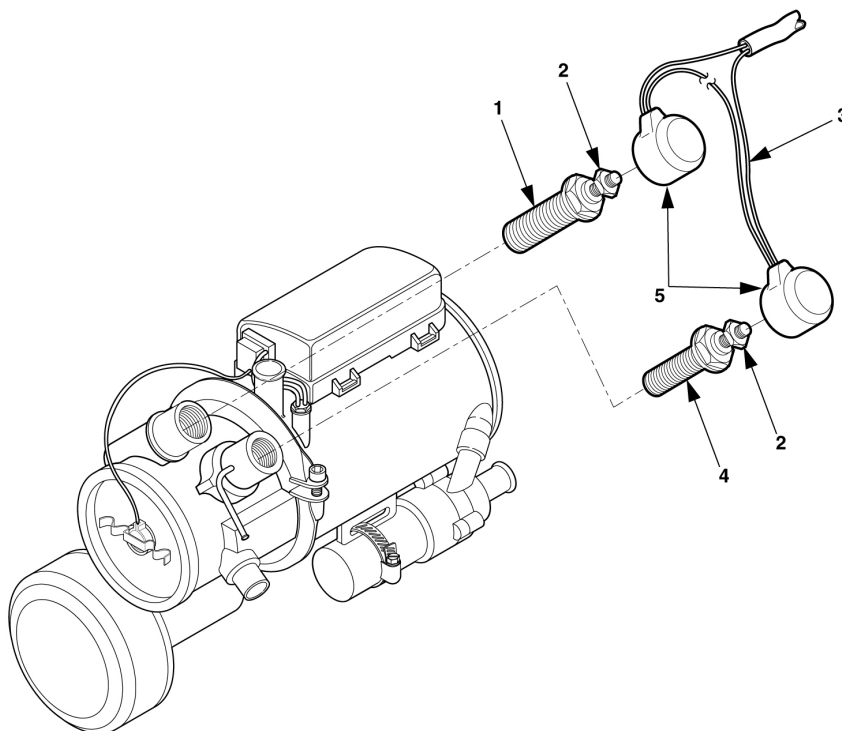


Figure 1. Winterization Kit Igniter/Glow Plug and Resistor.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**WINTERIZATION KIT, FUNCTION CODES PLATE/OPERATING INSTRUCTION
PLATE MAINTENANCE: INSPECTION, REMOVAL, REPLACEMENT, INSTALLATION**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)

Personnel Required

91D (1)

Materials/PartsGloves & Additional Protective Clothing
Goggles Splash-proof**Equipment Condition**Gen Set (FMC) with Win Kit properly installed

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

NOTE

Placement of function code plate: Function code plate edge should be placed approximately .50 in (12.7 mm) from top of control panel door when opened and approximately 11 in (279.4 mm) from right edge of control panel door. Plate shall be readable when door is opened.

INSPECTION

Inspect plate for illegible instructions, dents, cracks, etc.

END OF TASK**INSTALLATION****Function Codes Plate**

1. Lift generator control box door (Figure 1, Item 1).
2. Using function code plate (Figure 1, Item 4) as a template, drill four 1/8 in (3.175 mm) holes.
3. Install function codes plate (Figure 1, Item 4) using four blind rivets (Figure 1, Item 2). Rivet head shall be on the outside of unit.

END OF TASK

REMOVAL

Function Codes Plate

1. Lift generator control box door (Figure 1, Item 1).
2. Using electric drill with 1/8 in (3.175 mm) drill bit, drill each of the rivets (Figure 1, Item 2) and punch out.
3. Remove four rivets (Figure 1, Item 2) and function codes plate (Figure 1, Item 4).
4. Close control box door (Figure 1, Item 1).

END OF TASK

REPLACEMENT

Function Codes Plate

1. Lift generator control box door (Figure 1, Item 1).
2. Perform Steps 2 and 3 of Removal - Function Codes Plate.
3. Install new function codes plate (Figure 1, Item 4) using four blind rivets (Figure 1, Item 2). Rivet head shall be on outside of unit.
4. Close control box door (Figure 1, Item 1).

END OF TASK

INSPECTION

Operating Instruction Plate

Inspect plate for illegible instructions, dents, cracks, etc.

END OF TASK

INSTALLATION

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

NOTE

Placement of function code plate: Function code plate edge should be placed approximately .50 in (12.7 mm) from top of control panel door when opened and approximately 11 in (279.4 mm) from right edge of control panel door. Plate shall be readable when door is opened.

Operating Instruction Plate

1. Lift generator control box door (Figure 1, Item 1).

INSTALLATION – CONTINUED

2. Using operation instruction plate (Figure 1, Item 3) as a template, drill four 1/8 in (3.175 mm) holes.
3. Install operating instruction plate (Figure 1, Item 3) using four blind rivets (Figure 1, Item 2). Rivet head shall be on the outside of unit.

END OF TASK**REMOVAL****Operating Instruction Plate**

1. Lift generator control box door (Figure 1, Item 1).
2. Using electric drill with 1/8 in (3.175 mm) drill bit, drill each of the rivets (Figure 1, Item 2) and punch out.
3. Remove four rivets (Figure 1, Item 2) and operating instruction plate (Figure 1, Item 3).
4. Close control box door (Figure 1, Item 1).

END OF TASK**REPLACEMENT****Operating Instruction Plate**

1. Perform Steps 1 through 3 of Removal - Operating Instruction Plate.
2. Install new operating instruction plate (Figure 1, Item 3) using four blind rivets (Figure 1, Item 2). Rivet head shall be on outside of unit.
3. Close control box door (Figure 1, Item 1).

REPLACEMENT – CONTINUED

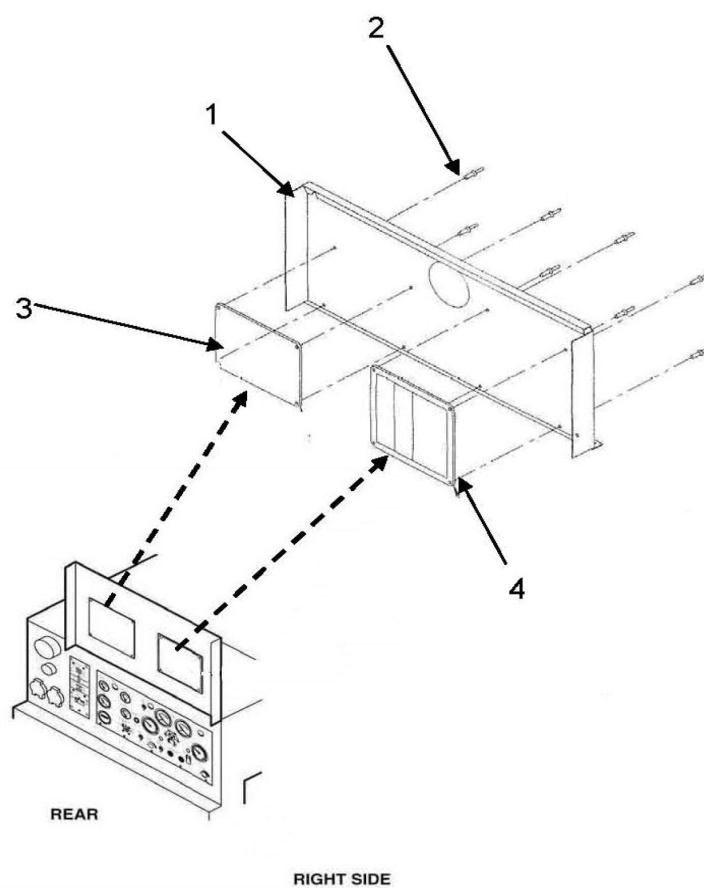


Figure 1. Function Codes Plate/Operating Instruction Plate Maintenance.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

WINTERIZATION KIT, REMOVAL PROCEDURES

INITIAL SETUP:**Test Equipment**

Multimeter

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

Materials/Parts

Gloves & Additional Protective Clothing
Splash-proof Goggles
Diesel fuel
Suitable container for catching fuel

Personnel Required

91D (1)

References

Batteries (WP 0010)
Air Cleaner Assembly (WP 0069)
Coolant System (WP 0071)
Radiator (WP 0072)
WP 0118, Initial Setup:

Equipment Condition

Gen Set (FMC) with Win Kit properly installed

Special Environmental Condition

Adequately Ventilated Work Area
Diesel fuel is toxic to eyes, skin, and respiratory tract

WARNING

Do not attempt to perform any maintenance tasks on the Winterization Kit while the generator set is operating. Failure to comply with this warning can cause injury or death to personnel.

REMOVAL INSTRUCTIONS

The following instructions to field maintenance have been provided so you can remove Heater Kit, 5 kW Generator Set NSN: 6115-01-476-8973 from your Generator Set.

REMOVAL

WARNING

Disconnect negative battery cable from right battery and the positive battery cable from the left battery before doing the following procedures. Reconnect cables in reverse order. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Cooling system operates at high temperature and pressure. Contact with high pressure steam and/or liquids can result in burns and scalding. Shutdown generator set, and allow system to cool before performing checks, services and maintenance, or wear gloves and additional protective clothing and goggles as required. Failure to comply with this warning can cause injury or death to personnel.

WARNING

Always remove radiator cap slowly to permit any pressure to escape. Failure to comply with this warning can cause injury to personnel.

REMOVAL – CONTINUED**WARNING**

Catch fuel in suitable container. Keep spilled fuel away from hot engine and all fires. Failure to comply with this warning can cause injury or death to personnel.

1. Turn heater and generator set off.
2. Open left and right access doors and disconnect negative battery cable from right battery and the positive battery cable from the left battery per WP 0010.
3. Drain generator coolant system per WP 0071.
4. Remove generator air filter inlet hose (WP 0069).
5. Open control panel access door (WP 0118, Figure 11, Item 1).
6. Remove control unit (Figure 1, Item 3) from center bulkhead housing (Figure 1, Item 4) with screws (Figure 1, Item 1), washers (Figure 1, Item 2) lockwashers (Figure 1, Item 5), and nuts (Figure 1, Item 6).
7. Open front storage box.
8. Remove electrical leads from (J6-16, J6-17, and J6-24 (WP 0118, Figure 10)).
9. Remove pins from J6-24, J6-26, and J6-25 (WP 0118, Figure 10).

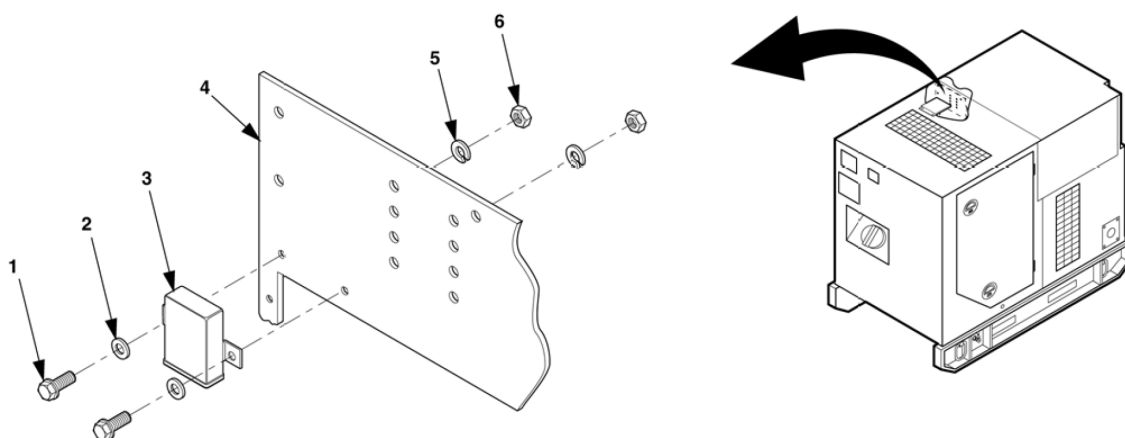


Figure 1. Winterization Kit Control Unit.

10. Remove toggle switch (WP 0118, Figure 11, Item 5), indicator light (WP 0118, Figure 11, Item 6), and heater switch label (WP 0118, Figure 11, Item 7) from instrument panel (WP 0118, Figure 11, Item 8).
11. Remove rivets (WP 0118, Figure 11, Item 4) from function code plate (WP 0118, Figure 11, Item 3) and operating plate (WP 0118, Figure 11, Item 2) and remove plates from control panel door (WP 0118, Figure 11, Item 1).
12. Remove fuse holder (WP 0118, Figure 10, Item 1) from the wiring harness (WP 0118, Figure 10, Item 2), and from (+) terminal of slave receptacle. Reassemble existing hardware.
13. Remove wiring harness (WP 0118, Figure 10, Item 2).
14. Remove left side fan guard (WP 0118, Figure 1, Item 4) and retain with hardware.
15. Remove fuel tubing (Figure 2, Items 7 and 9), butt splices (Figure 2, Items 12 and 6), and clamps (Figure 2, Items 11 and 5) from fuel pump (Figure 2, Item 8), and heater fuel intake (Figure 2, Item 10), along with the adapter (Figure 2, Item 4). Disconnect the fuel supply line (Figure 2, Item 13) from tee fitting (Figure 2, Item 3) and remove elbow (Figure 2, Item 2), then remove tee (Figure 2, Item 3) from primary fuel pump (Figure 2, Item 1). Reconnect fuel supply line (Figure 2, Item 13).

REMOVAL – CONTINUED

16. Remove fuel pump (Figure 3, Item 1) and clamp (Figure 3, Item 2). Reinstall existing hardware, but do not tighten.
17. Remove both ends of metallic hose (Figure 4, Item 1), clamps (Figure 4, Items 2 and 4), brace (Figure 4, Item 3), and attach hardware.

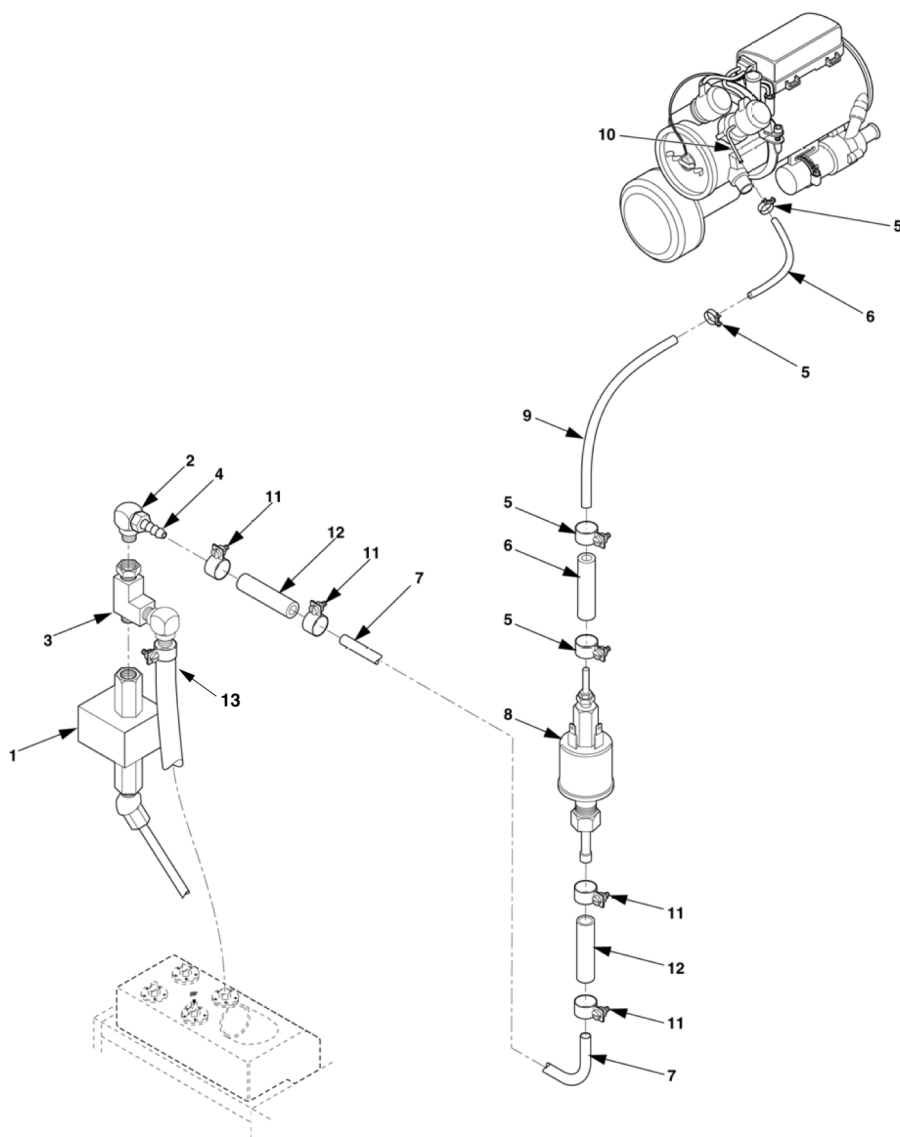


Figure 2. Winterization Kit Fuel System.

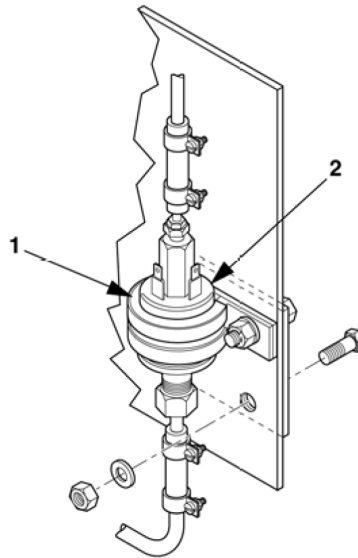
REMOVAL – CONTINUED

Figure 3. Winterization Kit Fuel Pump.

18. Remove coolant hoses (Figure 5, Items 1, 4, and 5), along with clamps (Figure 5, Items 3 and 7), making sure to replace the expansion plug (Figure 5, Item 6). Remove adapter group if installed, and cap off the water pump.
19. Remove heater assembly (Figure 6, Item 1), mounting plate (Figure 6, Item 2), bracket (Figure 6, Item 3), and hardware from left side control box panel. Reattached top hinge, lower hinge, and existing screws.
20. Reinstall left side fan guard (WP 0072, Figure 1, Item 4) with hardware taken off in Step 14.
21. Top off coolant.
22. Check all hoses for leaks.
23. Reconnect the negative battery cable and positive battery cable and close access doors.

REMOVAL – CONTINUED

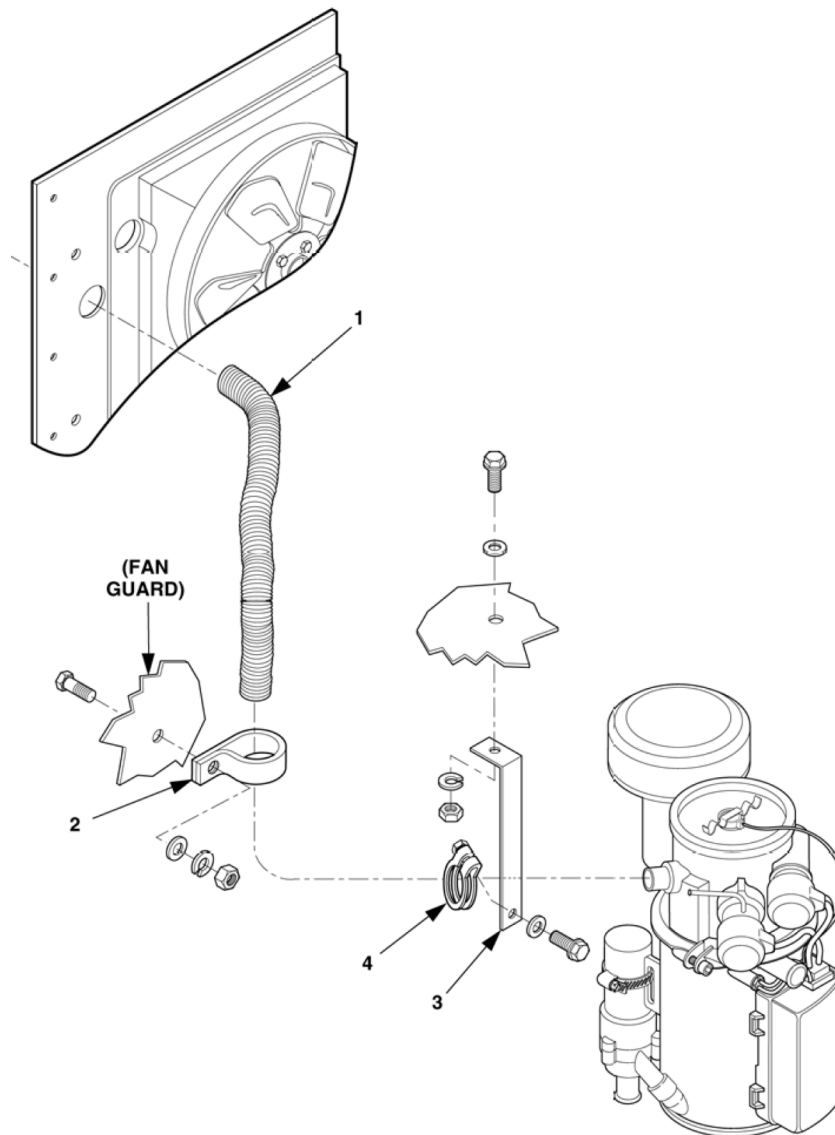
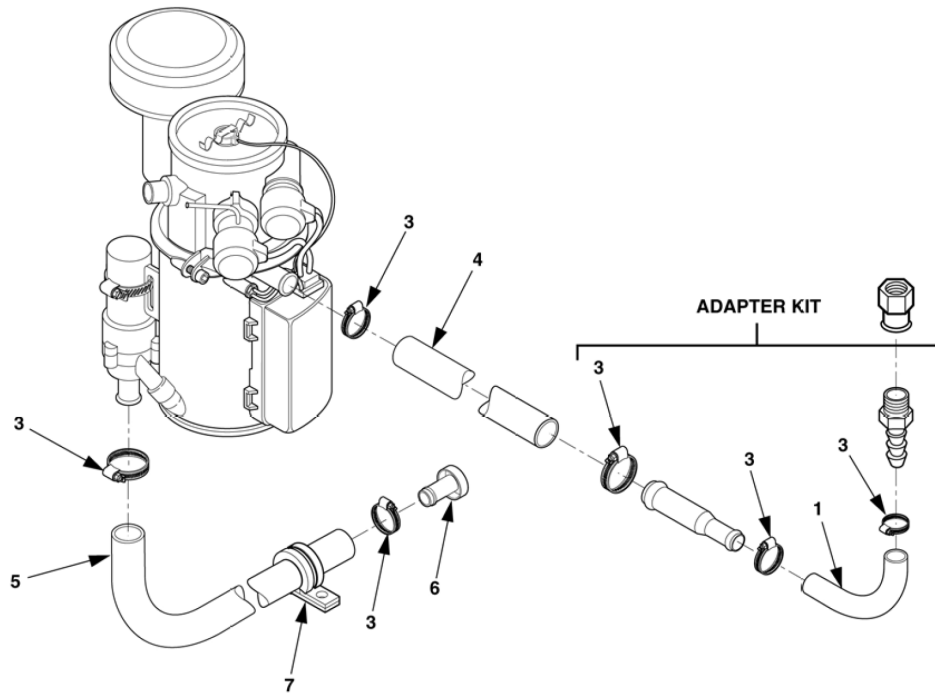


Figure 4. Winterization Kit Exhaust System and Brace.

REMOVAL – CONTINUED

**Figure 5. Winterization Kit Coolant System.**

REMOVAL – CONTINUED

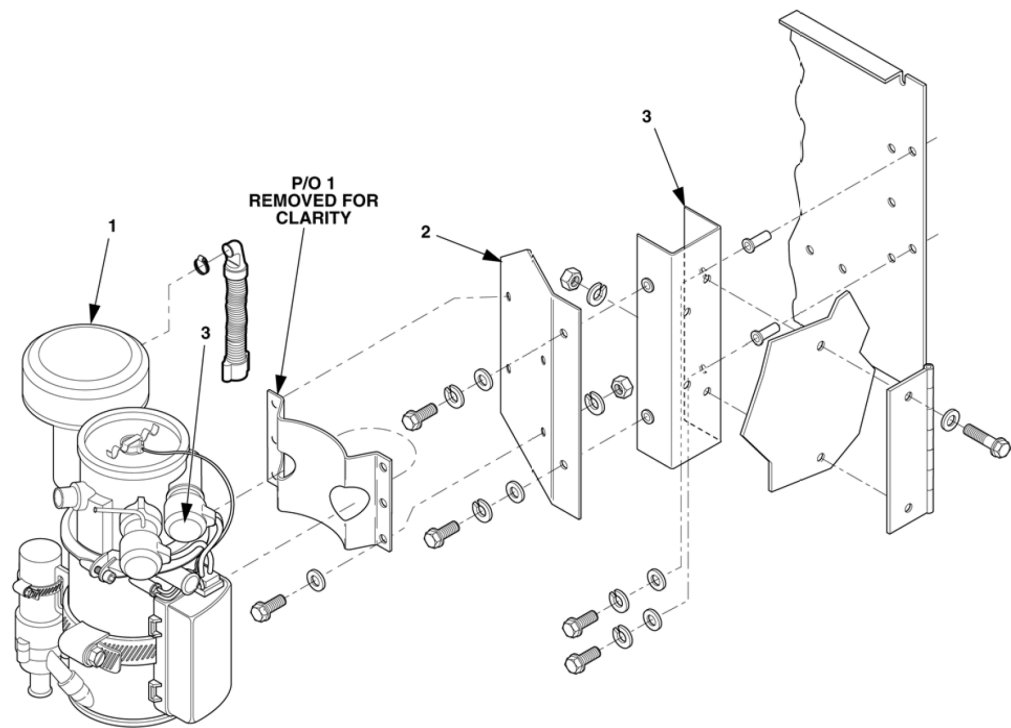


Figure 6. Winterization Kit Heater Assembly.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

ILLUSTRATED LIST OF MANUFACTURED ITEMS INTRODUCTION

ILLUSTRATED LIST OF MANUFACTURED ITEMS INTRODUCTION

Scope

WP 0132 through WP 0143 include complete instructions for making items authorized to be manufactured or fabricated at the field.

How to Use the Index of Manufactured Items

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the information which covers fabrication criteria.

Explanation of the Illustrations of Manufactured Items

All instructions needed by maintenance personnel to manufacture the item are included on the illustrations. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

INDEX OF MANUFACTURED ITEMS

P/N AND/OR DWG NO	PART DESCRIPTION	REFERENCE
88-20134	Holder, Control Panel	WP 0139, Figure 1
88-20296	Insulation, Skid	WP 0140, Figure 1
88-20305-1 through 88-20305-3, and 88-20305-5	Varistor Wires	WP 0143, Figure 1
88-20312	Battery Cable Assembly	WP 0132, Figure 1
88-20313	Battery Cable Assembly	WP 0133, Figure 1
88-20314	Battery Cable Assembly	WP 0134, Figure 1
88-20315	Battery Cable Assembly	WP 0135, Figure 1
88-20316	Battery Cable Assembly	WP 0136, Figure 1
88-20480	Transducer Assembly	WP 0142, Figure 1
88-20482	Solenoid Assembly, Fuel	WP 0141, Figure 1
88-22418-1	Diode Assembly	WP 0138, Figure 1
88-22460	Cord, Load Wrench	WP 0137, Figure 1

END OF WORK PACKAGE

FIELD MAINTENANCE
BATTERY CABLE ASSEMBLY (P/N 88-20312)

INITIAL SETUP:**Personnel Required**

91D (1)

References

TM-9-6115-641-24P

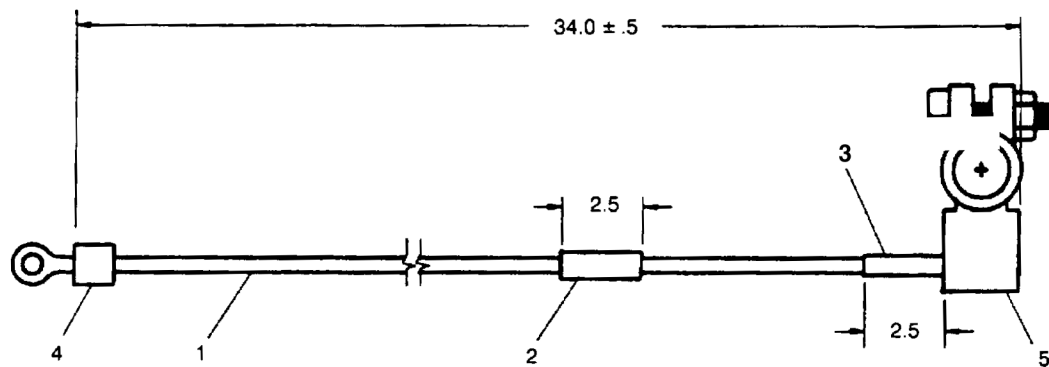


Figure 1. Battery Cable Assembly (P/N 88-20312).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required and length (L) of wire.

PROCEDURES:

1. Cut wire (Figure 1, Item 1) to length indicated.
2. Strip 0.75 in (1.90 cm) of insulation from each end of wire (Figure 1, Item 1).
3. Mark insulation sleeving (Figure 1, Item 2) with wire number "100A2", position on center of wire (Figure 1, Item 1) and shrink to fit.
4. Mark insulation sleeving (Figure 1, Item 3) with "NEGATIVE" and slide over end of wire (Figure 1, Item 1).
5. Crimp terminal (Figure 1, Item 4) on one end of wire (Figure 1, Item 1) and insulation sleeving (Figure 1, Item 3).
6. Crimp and solder terminal (Figure 1, Item 5) on end of wire (Figure 1, Item 1) with bolt orientation as shown, and battery post hole tapering open to far side.
7. Position insulation sleeving (Figure 1, Item 3) as shown and shrink to fit.

Battery Cable Assembly P/N 88-20312**List of Bulk Materials**

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
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P/N

END OF WORK PACKAGE

FIELD MAINTENANCE
BATTERY CABLE ASSEMBLY (P/N 88-20313)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

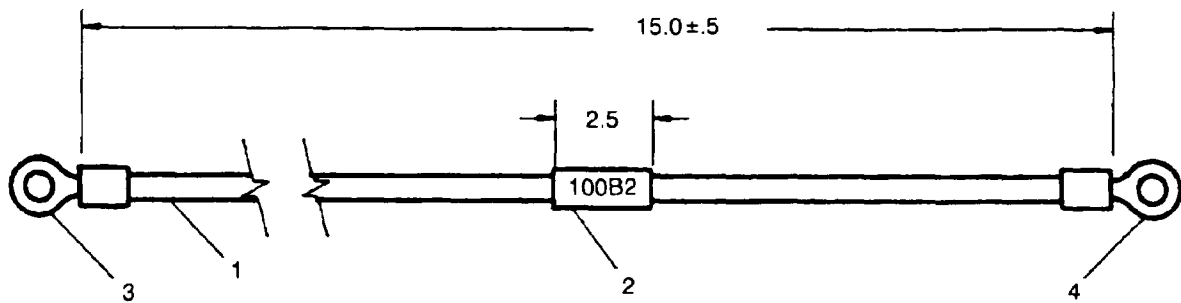


Figure 1. Battery Cable Assembly (P/N 88-20313).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut wire (Figure 1, Item 1) to length indicated.
2. Strip 0.75 in (1.90 cm) of insulation from each end of wire (Figure 1, Item 1).
3. Position insulation sleeving (Figure 1, Item 2) on center of wire, mark with wire number "100B2" and shrink to fit.
4. Crimp terminal (Figure 1, Item 3) on each end of wire (Figure 1, Item 1).
5. Crimp terminal (Figure 1, Item 4) on other end of wire (Figure 1, Item 1).

Battery Cable Assembly P/N 88-20313

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE
BATTERY CABLE ASSEMBLY (P/N 88-20314)

INITIAL SETUP:**Personnel Required**

91D (1)

References

TM-9-6115-641-24P

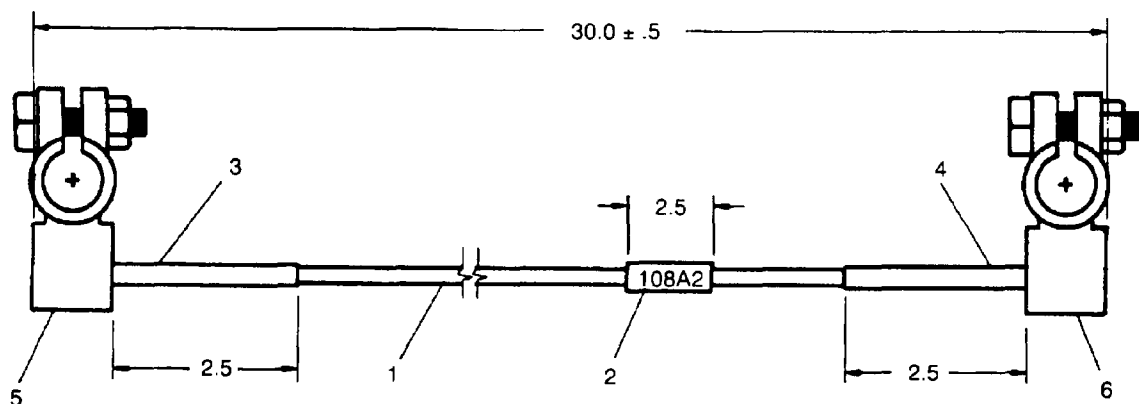


Figure 1. Battery Cable Assembly (P/N 88-20314).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut wire (Figure 1, Item 1) to length indicated.
2. Strip 0.75 in (1.90 cm) of insulation from each end of wire (Figure 1, Item 1).
3. Position insulation sleeving (Figure 1, Item 2) on center of wire, mark with wire number "108A2" and shrink to fit.
4. Mark insulation sleeving (Figure 1, Item 3) with "POSITIVE" and slide over each end of wire (Figure 1, Item 1).
5. Mark insulation sleeving (Figure 1, Item 4) with "NEGATIVE" and slide over each end of wire (Figure 1, Item 1).
6. Crimp and solder terminal (Figure 1, Items 5 and 6) on end of wire (Figure 1, Item 1) with bolt orientation as shown, and battery post hole tapering open to far side.
7. Position insulation sleeving (Figure 1, Items 3 and 4) as shown and shrink to fit.

Battery Cable Assembly P/N 88-20314**List of Bulk Materials**

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
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P/N

END OF WORK PACKAGE

FIELD MAINTENANCE
BATTERY CABLE ASSEMBLY (P/N 88-20315)

INITIAL SETUP:**Personnel Required**

91D (1)

References

TM-9-6115-641-24P

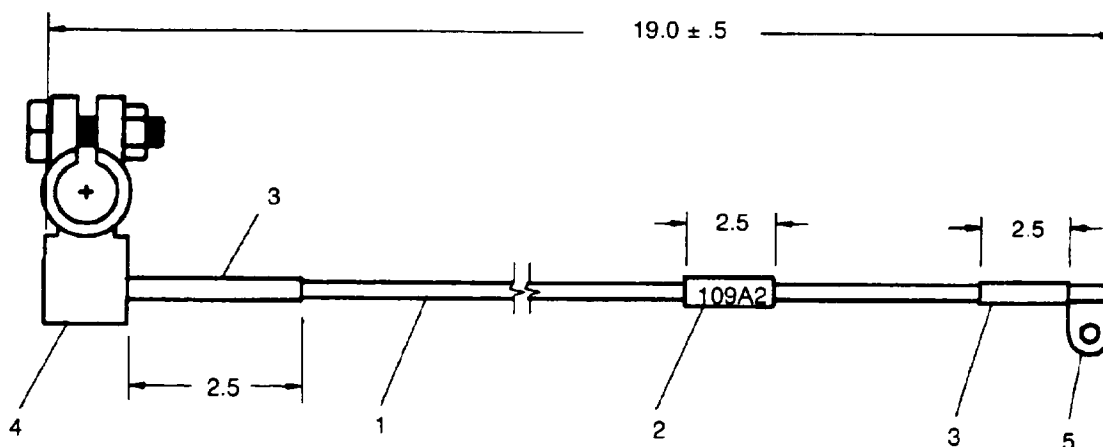


Figure 1. Battery Cable Assembly (P/N 88-20315).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut wire (Figure 1, Item 1) to length indicated.
2. Strip 0.75 in (1.90 cm) of insulation from each end of wire (Figure 1, Item 1).
3. Position insulation sleeving (Figure 1, Item 2) on center of wire, mark with wire number "109A2" and shrink to fit.
4. Mark insulation sleeving (Figure 1, Item 3) with "POSITIVE" and slide over each end of wire (Figure 1, Item 1).
5. Crimp and solder terminal (Figure 1, 4) on end of wire (Figure 1, 1) with bolt orientation as shown, and battery post hole tapering open to far side.
6. Crimp terminal (Figure 1, 5) on other end of wire (Figure 1, 1) as shown.
7. Position insulation sleeving (Figure 1, 3) as shown and shrink to fit.

Battery Cable Assembly P/N 88-20315**List of Bulk Materials**

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
-------------	----------	--------------------	--------------------------

P/N

END OF WORK PACKAGE

FIELD MAINTENANCE
BATTERY CABLE ASSEMBLY (P/N 88-20316)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

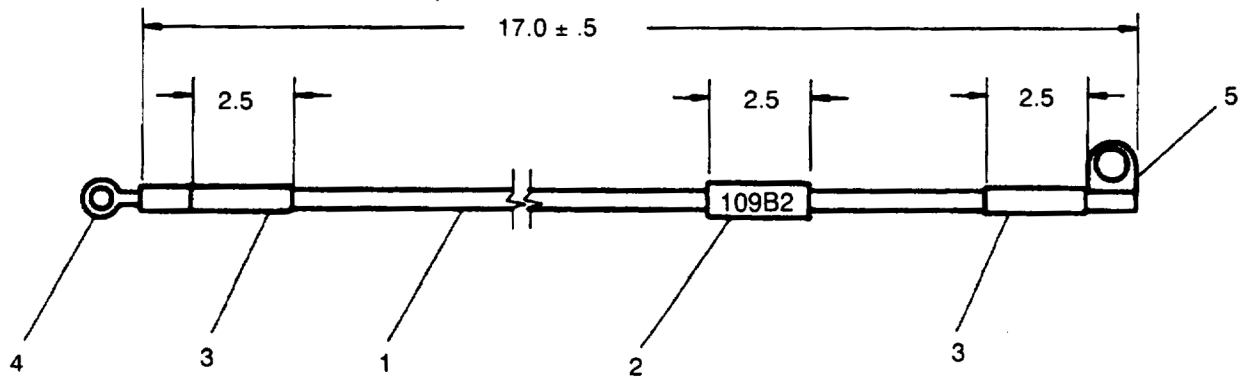


Figure 1. Battery Cable Assembly (P/N 88-20316).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut wire (Figure 1, Item 1) to length indicated.
2. Strip 0.75 in (1.90 cm) of insulation from each end of wire (Figure 1, Item 1).
3. Mark insulation sleeving (Figure 1, Item 2) with wire number "109B2", position on center of wire and shrink to fit.
4. Mark insulation sleeving (Figure 1, Item 3) with "NEGATIVE" and slide over each end of wire (Figure 1, Item 1).
5. Crimp terminal (Figure 1, Item 4) on one end of wire (Figure 1, Item 1) and terminal (Figure 1, Item 5) on other end.
6. Position insulation sleeving (Figure 1, Item 3) as shown and shrink to fit.

Battery Cable Assembly P/N 88-20316

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE
CORD, LOAD WRENCH (P/N 88-22460)

INITIAL SETUP:**Personnel Required**

91D (1)

References

TM-9-6115-641-24P

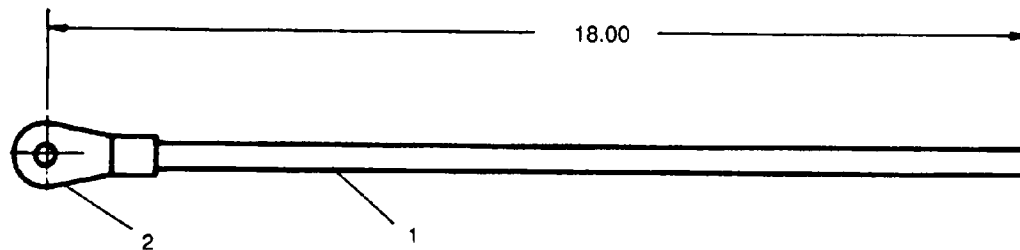


Figure 1. Cord, Load Wrench (P/N 88-22460).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut rope (Figure 1, Item 1) to length indicated.
2. Crimp terminal (Figure 1, Item 2) on one end of rope (Figure 1, Item 1).

Cord, Load Wrench P/N 88-22460

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE
DIODE ASSEMBLY (P/N 88-22418-1)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

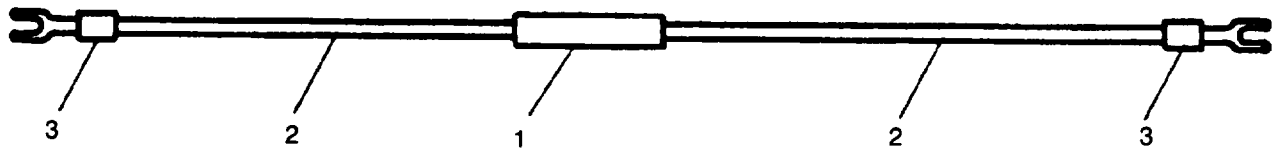


Figure 1. Diode Assembly (P/N 88-22418-1).

NOTE

All dimensions are expressed in inches.

NOTES:

Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Position 0.75 in (1.90 cm) of insulation sleeving (Figure 1, Item 2) on each lead of diode (Figure 1, Item 1), leaving 0.25 in (0.63 cm) of bare wire on each lead. Shrink sleeving to fit.
2. Crimp and solder terminals (Figure 1, Item 3) on end of each diode (Figure 1, Item 1) lead.

Diode Assembly P/N 88-22418-1

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE
HOLDER, CONTROL PANEL (P/N 88-20134)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

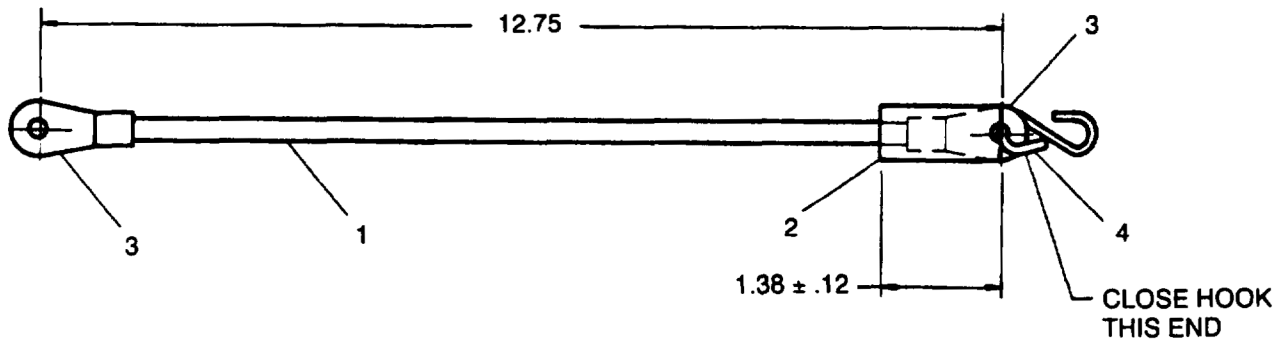


Figure 1. Holder, Control Panel (P/N 88-20134).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut rope (Figure 1, Item 1) to length indicated.
2. Slide insulation sleeving (Figure 1, Item 2) over one end of rope (Figure 1, Item 1).
3. Crimp terminal (Figure 1, Item 3) on each end of rope (Figure 1, Item 1).
4. Install hook (Figure 1, Item 4) in one terminal (Figure 1, Item 3) and close hook end securing it to terminal.
5. Position insulation sleeving (Figure 1, Item 2) as shown and shrink to fit.

Holder, Control Panel P/N 88-20134

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE
INSULATION, SKID (P/N 88-20296)

INITIAL SETUP:

Personnel Required

91D (1)

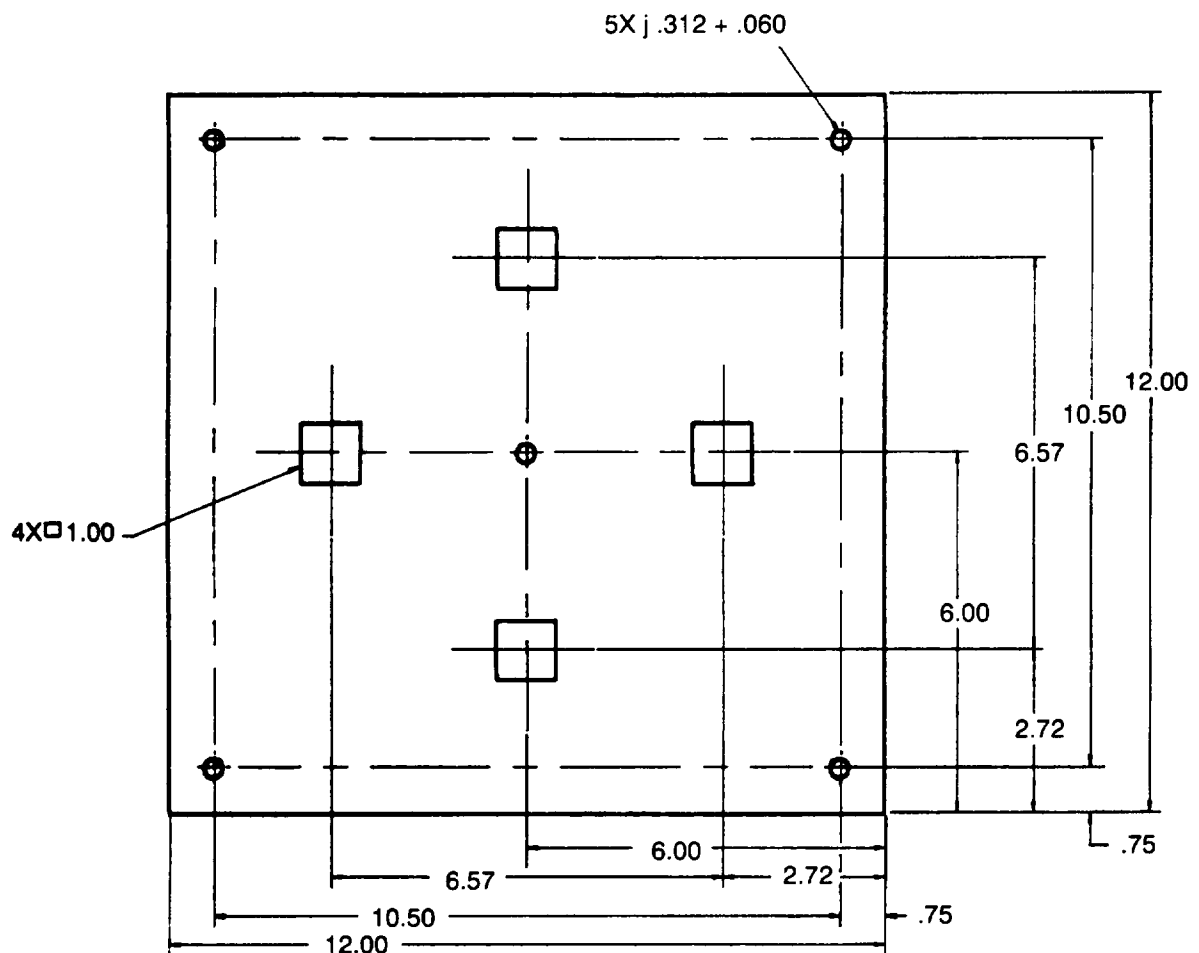


Figure 1. Insulation, Skid (P/N 88-20296).

NOTES:

1. Dimensions shown are in inches.
2. Tolerances are 0.1 in (0.25 cm) unless otherwise stated.

PROCEDURES:

1. Cut foam to dimensions shown.

-
2. Drill holes as shown.

Insulation, Skid P/N 88-20296

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
Foam, Sound Absorbing		P/N 88-21110	

END OF WORK PACKAGE

FIELD MAINTENANCE
SOLENOID ASSEMBLY, FUEL (P/N 88-20482)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

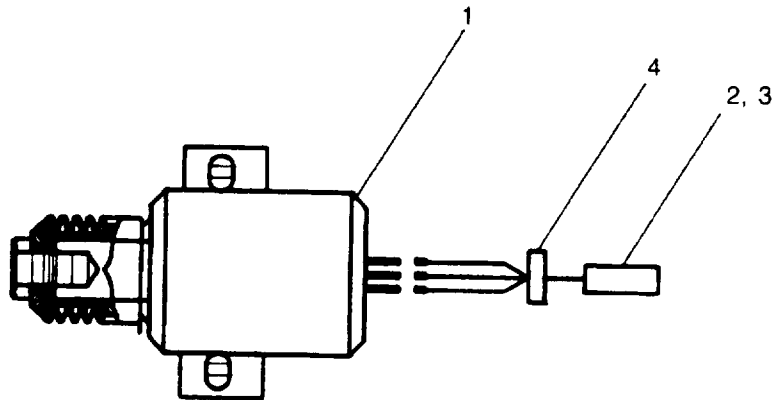


Figure 1. Solenoid Assembly, Fuel (P/N 88-20482).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Strip 0.125 in (0.31 cm) of insulation from end of each pump (Figure 1, Item 1) lead.
2. Crimp pin (Figure 1, Item 2) on end of each solenoid (Figure 1, Item 1) lead.
3. Insert pins (Figure 1, Item 2) into housing (Figure 1, Item 3) with "HOLD" wire in position 1, "PULL" wire in position 2, and "C" wire in position 3.
4. Mark "P14" on strap (Figure 1, Item 4) and install in position shown.

Solenoid Assembly, Fuel P/N 88-20482

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE
TRANSDUCER ASSEMBLY (P/N 88-20480)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

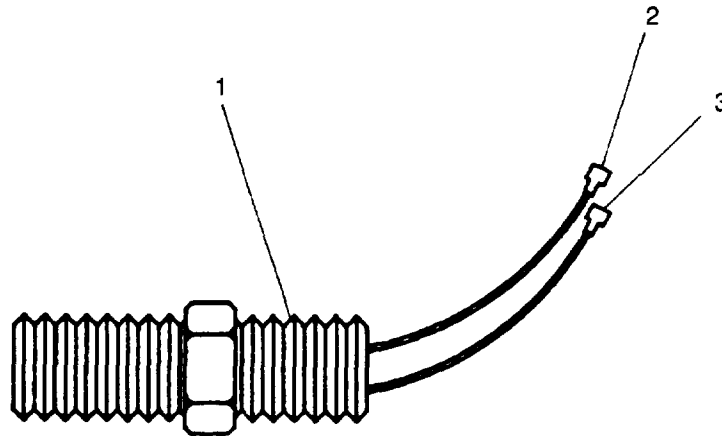


Figure 1. Transducer Assembly (P/N 88-20480).

NOTES:

1. Refer to TM 9-6115-641-24P for materials required.
2. Transducer wiring is not polarity sensitive, so position of terminals is not important.

PROCEDURES:

1. Strip 0.25 in (0.63 cm) of insulation from end of each transducer (Figure 1, Item 1) lead.
2. Crimp male terminal (Figure 1, Item 2) on one wire and female terminal (Figure 1, Item 3) on other wire.

Transducer Assembly P/N 88-20480

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

FIELD MAINTENANCE

VARISTOR WIRES (P/NS 88-20305-1 THROUGH 88-20305-3, AND 88-20305-5)

INITIAL SETUP:

Personnel Required

91D (1)

References

TM-9-6115-641-24P

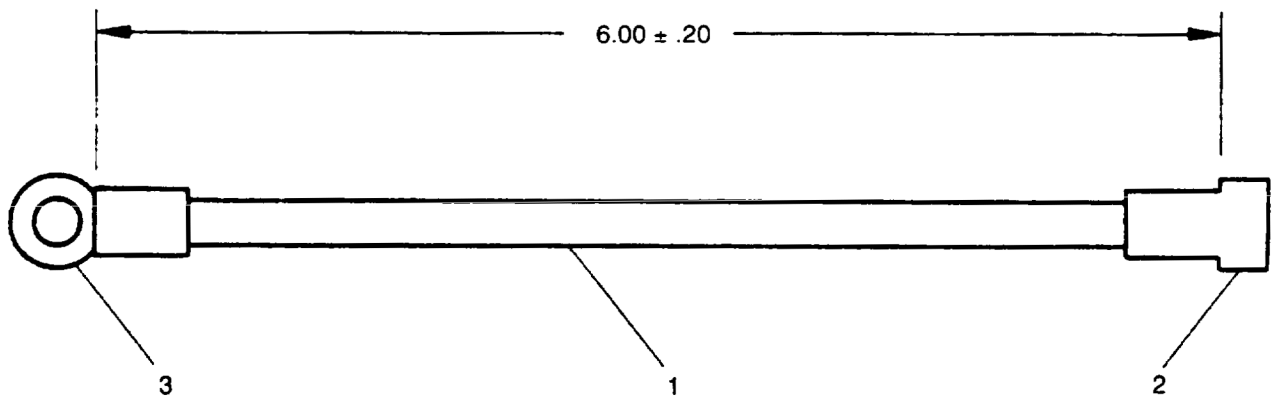


Figure 1. Varistor Wires (P/Ns 88-20305-1 through 88-20305-3, and 88-20305-5).

NOTES:

1. Dimensions shown are in inches.
2. Refer to TM 9-6115-641-24P for materials required.

PROCEDURES:

1. Cut wire (Figure 1, Item 1) to length indicated.
2. Strip 0.50 in (1.27 cm) from each end of wire (Figure 1, Item 1).
3. Crimp terminal (Figure 1, Item 2) on one end of wire (Figure 1, Item 1) and terminal (Figure 1, Item 3) on other end.

Varistor Wires P/N 88-20305-1 through 88-20305-3, and 88-20305-5

List of Bulk Materials

DESCRIPTION	QUANTITY	IDENTIFYING NUMBER	REFERENCE INFORMATION
P/N			

END OF WORK PACKAGE

OPERATOR MAINTENANCE

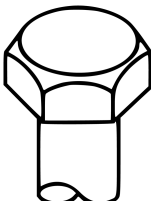
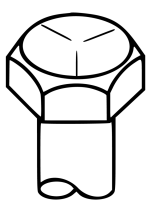
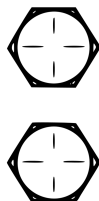
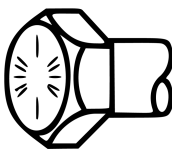
TORQUE LIMITS

TORQUE INSTRUCTIONS

CAUTION

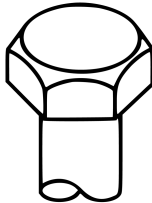
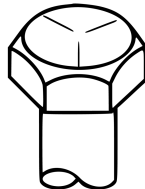
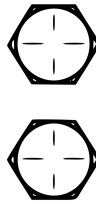
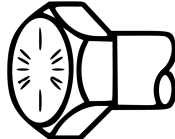
If replacement capscrews are of a higher grade than originally supplied, use torque specifications for that placement. This will prevent equipment damage due to over torquing.

Table 1. Torque Limits.

SAE GRADE NUMBER	1 OR 2	5	6 OR 7	8					
QUALITY OF MATERIAL	INDETERMINATE	MINIMUM COM- MERCIAL	MEDIUM COM- MERCIAL	BEST COM- MERCIAL					
CAPSCREW HEAD MARKINGS									
NOTE HEAD MARKING MAY VARY WITH DIFFERENT MANUFACTURERS.									
CAPSCREW BODY SIZE		TORQUE		TORQUE		TORQUE		TORQUE	
(INCHES)	(THREAD)	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)
1/4	20	5	(7)	8	(11)	10	(14)	12	(16)
	28	6	(8)	10	(14)			14	(19)
5/16	18	11	(15)	17	(23)	19	(26)	24	(33)
	24	13	(18)	19	(16)			27	(37)
3/8	16	18	(24)	31	(42)	34	(46)	44	(60)
	24	20	(27)	35	(47)			49	(66)
7/16	14	28	(38)	49	(66)	55	(75)	70	(95)
	20	30	(41)	55	(75)			78	(106)
1/2	13	39	(53)	75	(102)	85	(115)	105	(142)
	20	41	(56)	85	(115)			120	(163)
9/16	12	51	(69)	110	(149)	120	(163)	155	(210)
	18	55	(75)	120	(163)			170	(231)
5/8	11	83	(113)	150	(203)	167	(226)	210	(285)
	18	95	(129)	170	(231)			240	(325)

TORQUE INSTRUCTIONS – CONTINUED

Table 1. Torque Limits. – Continued

SAE GRADE NUMBER	1 OR 2	5	6 OR 7	8					
QUALITY OF MATERIAL	INDETERMINATE	MINIMUM COM-MERCIAL	MEDIUM COM-MERCIAL	BEST COM-MERCIAL					
CAPSCREW HEAD MARKINGS									
NOTE HEAD MARKING MAY VARY WITH DIFFERENT MANUFACTURERS.									
CAPSCREW BODY SIZE		TORQUE		TORQUE		TORQUE		TORQUE	
(INCHES)	(THREAD)	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)
3/4	10	105	(142)	270	(366)	280	(380)	375	(508)
	16	115	(156)	295	(400)			420	(569)
7/8	9	160	(217)	395	(536)	440	(597)	605	(820)
	14	175	(237)	435	(590)			675	(915)
1	8	235	(319)	590	(800)	660	(895)	910	(1234)
	14	250	(339)	660	(895)			990	(1342)

NOTE

Always use the torque values listed above when specific torque values are not available.

END OF WORK PACKAGE

CHAPTER 4

SUSTAINMENT MAINTENANCE INSTRUCTIONS

SUSTAINMENT MAINTENANCE
**MAINTENANCE OF DC ELECTRICAL SYSTEM, BATTERY CHARGING
ALTERNATOR: DISASSEMBLY, INSPECTION, TESTING, ASSEMBLY**

INITIAL SETUP:**Test Equipment**

Multimeter

Tools and Special ToolsGeneral Mechanic's Tool Kit (GMTK)
Arbor press**Materials/Parts**Rotor assembly (if indications are other than stated)
Rectifier bridge assembly (if readings are the same in
both directions for any diode)
Stator (if defective)
Brush Assembly (if indications are other than stated)**Materials/Parts - cont'd**Diode-trio assembly (if readings are the same in both
directions for any diode)
New lockwashers
Thermo Compound (WP 0150, Table 1, Item 8)**Personnel Required**91D (1)
Assistant (1)**References**

Expendable and Durable Items List (WP 0150)

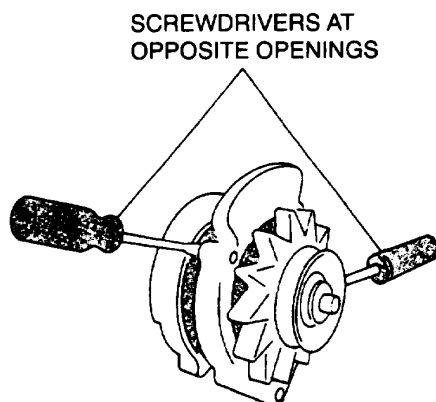
DISASSEMBLY

1. Remove terminal nuts (Figure 7, Item 1), washers (Figure 7, Item 2), bolts (Figure 7, Item 3), back cover (Figure 7, Item 4), and gasket (Figure 7, Item 5) from rear housing (Figure 7, Item 19).
2. Remove nuts (Figure 7, Item 6), strap (Figure 7, Item 7), and brush assembly (Figure 7, Item 8) from voltage regulator (Figure 7, Item 10).
3. Remove bolts (Figure 7, Item 9), insulating washers (Figure 7, Item 11), and voltage regulator (Figure 7, Item 10) from rear housing (Figure 7, Item 19).
4. Remove nut (Figure 7, Item 12) and straighten strap (Figure 7, Item 13).
5. Remove bolts (Figure 7, Item 14); tag and remove stator (Figure 7, Item 21) leads from diode-trio (Figure 7, Item 16).
6. Remove bolts (Figure 7, Item 15), diode-trio (Figure 7, Item 16), and rectifier bridge (Figure 7, Item 17) from rear housing (Figure 7, Item 19).
7. Match mark front and rear housings (Figure 7, Items 29 and 19), and remove thru-bolts (Figure 7, Item 18).

CAUTION

Do not insert screwdriver blades deeper than 1/16 in (1.58 mm) to avoid damaging stator winding.

8. Insert two flat tip screw drivers in opposite openings between stator (Figure 7, Item 21) and rear housing (Figure 7, Item 19) and pry units apart, refer to Figure 1.

DISASSEMBLY – CONTINUED**Figure 1. Housing Separation.**

9. Remove rear housing (Figure 7, Item 19) and stator (Figure 7, Item 21) from front housing (Figure 7, Item 29).
10. Remove nut (Figure 7, Item 22), lock washer (Figure 7, Item 23), pulley (Figure 7, Item 24), fan (Figure 7, Item 25), spacer (Figure 7, Item 26), and woodruff key (Figure 7, Item 27) from rotor assembly (Figure 7, Item 28) shaft. Discard lockwasher (Figure 7, Item 23).
11. Using arbor press, remove rotor assembly (Figure 7, Item 28) from front housing (Figure 7, Item 29).
12. Remove bearing retaining screws (Figure 7, Item 30) and press bearing (Figure 7, Item 31) from front housing (Figure 7, Item 29).

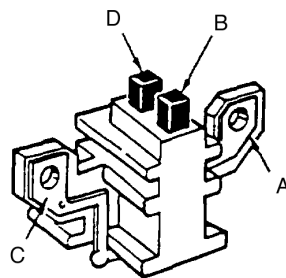
END OF TASK**INSPECTION**

1. Inspect brushes for cracks, grooves on sides, being oil soaked, and that they are at least 3/16 in (4.76 mm) long.
2. Inspect rear housing (Figure 7, Item 19) for cracked or broken casting, stripped threads, and severe wear of rear bearing bore.
3. Inspect fan (Figure 7, Item 25) for cracked or broken fins and for worn mounting hole.
4. Inspect front housing (Figure 7, Item 29) for cracked or broken casting, stripped threads, and bore in mounting foot for elongation.
5. Inspect other components for damage such as broken terminals or insulation, discoloration, stripped threads, and other obvious damage.
6. Replace damaged components as necessary.

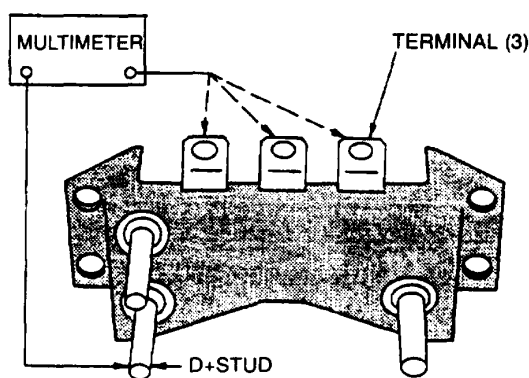
END OF TASK**TESTING**

1. Set multimeter for ohms and check brush assembly (Figure 2) for continuity between mount A and brush B, and mount C and brush D. Check for open circuits between mount A and mount C, mount A and brush D, mount C and brush B, and brush B and brush D. Replace brush assembly if indications are other than stated.

TESTING – CONTINUED

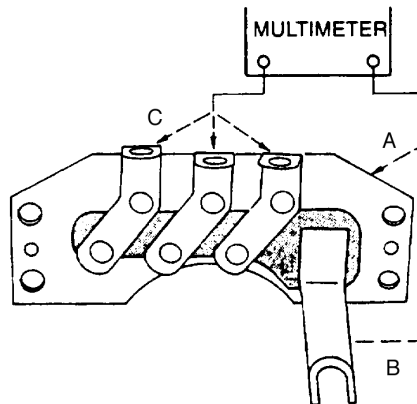
**Figure 2. Brush Test.**

2. Set multimeter for ohms and check diode-trio assembly (Figure 3) by noting multimeter indications between D+ stud and each of stator terminals. Reverse multimeter leads, repeat checks and note indications. If readings are the same in both directions for any diode, replace entire diode-trio assembly. A good diode will show a high indication in one direction and a low indication in the other.

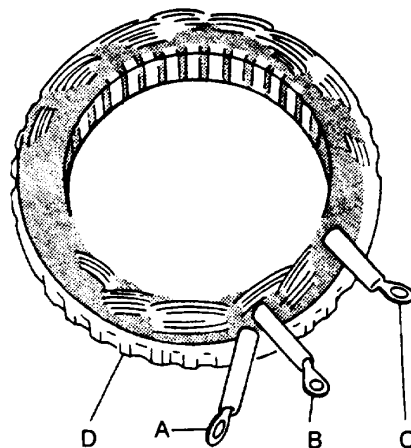
**Figure 3. Diode-Trio Test.**

3. Set multimeter for ohms and check rectifier bridge assembly (Figure 4) by noting multimeter indications between point A and each point C, and between point B and each point C. Reverse leads, repeat checks and note indications. If readings are the same in both directions for any diode, replace entire rectifier bridge assembly. A good diode will have a high indication in one direction and a low indication in the other.

TESTING – CONTINUED

**Figure 4. Rectifier Bridge Test.**

4. Set multimeter for ohms and check stator (Figure 5) for open circuits between point D (laminations) and each terminal A, B, and C. If continuity is noted between laminations and any terminal, stator is defective and must be replaced.

**Figure 5. Stator Winding Test.****NOTE**

Place test leads on edges of slip rings to avoid creating arcs on brush contact surfaces.

5. Set multimeter for ohms and check rotor assembly (Figure 6) for 40.5-43.8 ohms indication between slip rings. Also check that open circuits are indicated between rotor body and each slip ring. Replace entire rotor assembly if indications are other than stated.

TESTING – CONTINUED

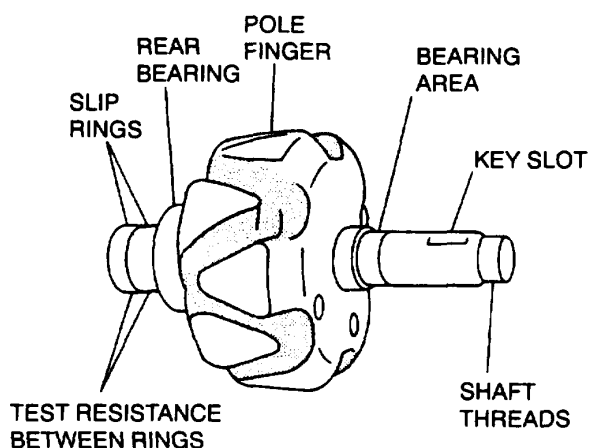


Figure 6. Rotor Test.

END OF TASK

ASSEMBLY

1. Using arbor press, install front bearing (Figure 7, Item 31) in front housing (Figure 7, Item 29).

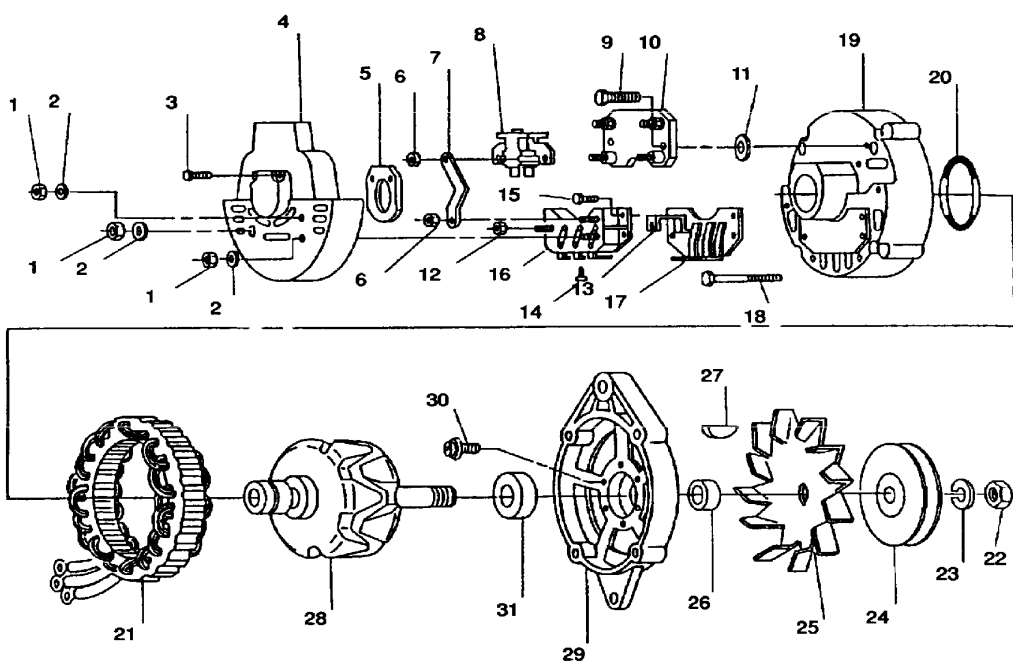


Figure 7. Alternator Assembly.

2. Install front bearing retaining screws (Figure 7, Item 30). Torque screws 25 to 35 in•lbs (2.8 to 3.9 N•m).

ASSEMBLY – CONTINUED

3. Using arbor press, press front housing (Figure 7, Item 29) over rotor assembly (Figure 7, Item 28) until inner bearing race contacts shoulder on shaft, refer to Figure 8.

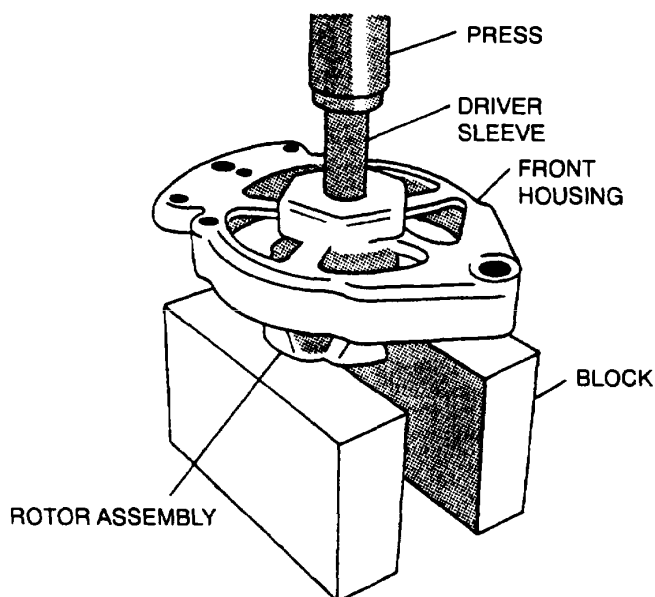


Figure 8. Assembling Front Housing to Rotor.

4. Position pulley spacer (Figure 7, Item 26), woodruff key (Figure 7, Item 27), fan (Figure 7, Item 25), and pulley (Figure 7, Item 24) on rotor assembly (Figure 7, Item 28) shaft.
5. Install new lock washer (Figure 7, Item 23) and nut (Figure 7, Item 22) on rotor assembly (Figure 7, Item 28) shaft. Torque nut 35 to 50 ftlbs (47 to 68 N•m).
6. Position stator (Figure 7, Item 21) in front housing (Figure 7, Item 29) with stator leads at top and notches in lamination aligned with bolt holes.
7. If removed, install retainer (Figure 7, Item 20) in rear housing (Figure 7, Item 19).
8. Position rear housing (Figure 7, Item 19) over slip rings of rotor assembly (Figure 7, Item 28) with front and rear housing (Figure 7, Items 29 and 19) bolt holes aligned, and stator leads extending through openings at top of rear housing (Figure 7, Item 19).
9. Install thru-bolts (Figure 7, Item 18) and tighten evenly. Torque bolts 50 to 60 in•lbs (5.6 to 6.8 N•m).
10. If necessary, remove thru-bolts (Figure 7, Item 18) and rotate rear housing (Figure 7, Item 19) and stator (Figure 7, Item 21) to align housings as match marked on disassembly. Reinstall bolts and torque evenly 50 to 60 in•lbs (5.6 to 6.8 N•m).
11. Insert strap (Figure 7, Item 13) of rectifier bridge (Figure 7, Item 17) through slot in diode-trio (Figure 7, Item 16) body. Bend strap (Figure 7, Item 13) over B+ terminal and secure with cone nut (Figure 7, Item 12).
12. Apply thin film of thermo compound (WP 0150, Item 8) to back of rectifier bridge (Figure 7, Item 17) and mating area of rear housing (Figure 7, Item 19).
13. Install diode-trio (Figure 7, Item 16) and rectifier bridge (Figure 7, Item 17) on rear housing (Figure 7, Item 19) with bolts (Figure 7, Item 15) and connect stator leads with bolts (Figure 7, Item 14). Remove tags.
14. Install voltage regulator (Figure 7, Item 10) to rear housing (Figure 7, Item 19) with insulating washers (Figure 7, Item 11) and bolts (Figure 7, Item 9).
15. Install brush assembly (Figure 7, Item 8) and strap (Figure 7, Item 7) with nuts (Figure 7, Item 6).

ASSEMBLY – CONTINUED

16. Position felt gasket (Figure 7, Item 5) in back cover (Figure 7, Item 4) and install back cover (Figure 7, Item 4) on rear housing (Figure 7, Item 19) with bolts (Figure 7, Item 3).
17. Install terminal washers (Figure 7, Item 2) and terminal nuts (Figure 7, Item 1).
18. Perform alternator performance test as follows:
 - a. Mount alternator on test fixture capable of providing 5,000 alternator rpm.

CAUTION

Make sure connectors are tight to avoid possible damage to instruments, alternator, or wiring due to short circuits.

- b. Set up test circuit as shown in Figure 9.

NOTE

Carbon pile and ammeter must be capable of handling the alternator rated output.

- c. Starting with carbon pile off, slowly increase load while observing ammeter and maintaining 5,000 rpm. Increase load until an output voltage of 27.0-29.0 volts is achieved. Record the output current at this point. Acceptable minimum current is 16.2 amperes at 70 to 80 °F (21 to 27 °C).

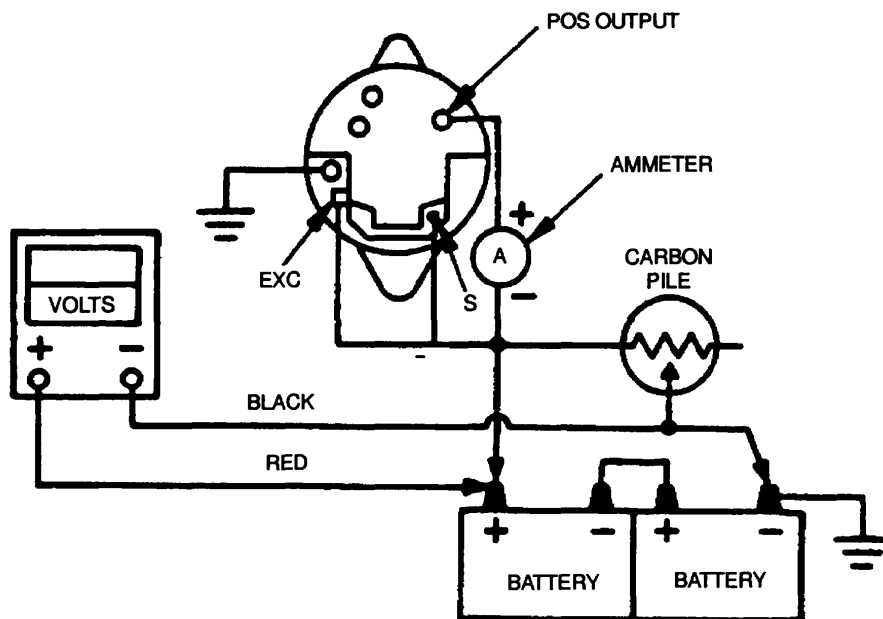


Figure 9. Performance Test Circuit.

END OF TASK

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE
MAINTENANCE OF COOLANT SYSTEM, RADIATOR REPAIR

INITIAL SETUP:

References

TM-750-254

Repair radiator in accordance with TM 750-254.

END OF WORK PACKAGE

CHAPTER 5

FIELD AND SUSTAINMENT SUPPORTING INFORMATION

FIELD AND SUSTAINMENT MAINTENANCE
REFERENCES

SCOPE

This work package lists all forms, regulations, pamphlets, specifications, standards, technical manuals, technical bulletins, lubrication orders, field manuals, and miscellaneous publications referenced in this TM.

FORMS

AFTO Form 22	Air Force Reporting of Errors Form
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 5988-E	Equipment Inspection and Maintenance Worksheet
DD Form 314	Preventive Maintenance Schedule and Record
SF Form 364	Report of Discrepancy
SF Form 368	Product Quality Deficiency Report

ARMY REGULATIONS

AR 310-25	Dictionary of United States Army Terms
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DEPARTMENT OF THE ARMY PAMPHLETS

DA PAM 738-50	The Army Maintenance Management System (TAMMS)
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MILITARY SPECIFICATIONS

MIL-A-53009A(1)	Additive, Antifreeze Extender, Liquid Cooling Systems
MIL-DTL-5624U	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-83133E	Turbine Fuels, Aviation, Kerosene Types, NATO F-34 (JP-8), NATO F-35, and JP-8+100
MIL-PRF-2104H	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-PRF-46167D	Lubricating Oil, Internal Combustion Engine, Arctic

COMMERCIAL ITEM DESCRIPTIONS

A-A-52557A	Fuel Oil, Diesel; for Posts, Camps, and Stations
A-A-52624A	Antifreeze, Multi Engine Type
ASME-Y14.38M	Abbreviations for Use on Drawings, and in Specifications, Standards and Technical Documents
PPP-G-2919	Generator Sets, Mobile Electric Power and Supplemental Equipment, Packaging of

MILITARY STANDARDS

MIL-HDBK-729 NOT1	Corrosion and Corrosion Prevention Metals
MIL-STD-129P(4)	Military Marking for Shipment and Storage

TECHNICAL MANUALS

TM 43-0139	Painting Instructions for Army Material
TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command)

TECHNICAL MANUALS – CONTINUED

TM 750-254	Cooling Systems: Tactical Vehicles
TM 9-2815-252-24	Unit, Direct Support and General Support Maintenance Instructions, Diesel Engine, Model DN2M, 2-Cylinder, 0.9 Liter
TM 9-2815-252-24P	Unit, Direct Support and General Support Maintenance Repair Parts and Special Tools List, Diesel Engine, Model DN2M, 2-Cylinder, 0.9 Liter
TM 9-6115-641-10	Operator's Manual, Generator Set, Skid Mounted, Tactical Quiet, 5 kW, 60 and 400 Hz
TM 9-6115-641-24P	Unit, Direct Support and General Support Maintenance Repair Parts and Special Tools List, Generator Set, Tactical Quiet, 5 kW, 60 and 400 Hz
TM 9-6140-200-14	Operator's, Unit, Direct Support and General Support Maintenance Manual for Lead Storage Batteries

TECHNICAL BULLETINS

TB 740-97-2	Preservation of USAMECOM Mechanical Equipment for Shipment and Storage
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LUBE ORDERS

LO 9-6115-641-12	Generator Set, Skid Mounted, Tactical Quiet 5 kW, 60 and 400 Hz
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FIELD MANUALS

FM 21-30	Military Symbols
FM 21-40	Chemical, Biological, Radiological, and Nuclear Defense
FM 3-11.3	Multiservice Tactics, Techniques and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance
FM 3-11.4	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection
FM 3-11.5	Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination
FM 31-70	Basic Cold Weather Manual
FM 4-25.11	First Aid
FM 5-424	Theater of Operations, Electrical Systems
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -65°)

MISCELLANEOUS PUBLICATIONS

AFR 66-1	Air Force Maintenance Forms and Records
AR 700-138	Army Logistics Readiness and Sustainability
AR 735-11-2	Reporting of Supply Discrepancies
AR 750-1	Army Materiel Maintenance Policy and Retail Maintenance Operations
AR 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use
ATPD 2232	Engines: Preparation for Storage and Shipment of, Purchase Description
CTA 50-970	Expendable Items (Except Medical Class V, Repair Parts and Heraldic Items)
CTA 8-100	Army Medical Department Expendable/Durable Items
TO 38-1-5	Processing and Inspection of Nonmounted, Nonaircraft Gasoline and Diesel Engines for Storage and Shipment

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE

INTRODUCTION FOR STANDARD TWO-LEVEL MAC

MAINTENANCE ALLOCATION CHART (MAC)

INTRODUCTION

The Army Maintenance System MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

This MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field - includes two subcolumns, Crew (C) and Maintainer (F).

Sustainment - includes two subcolumns, Below Depot (H) and Depot (D).

The maintenance to be performed at field and sustainment levels is described as follows:

1. Crew maintenance. The responsibility of a using organization to perform maintenance on its assigned equipment. It normally consists of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies. The replace function for this level of maintenance is indicated by the letter "C" in the third position of the SMR code. A "C" appearing in the fourth position of the SMR code indicates complete repair is possible at the crew maintenance level.
2. Maintainer maintenance. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "F" appearing in the third position of the SMR code. An "F" appearing in the fourth position of the SMR code indicates complete repair is possible at the field maintenance level. Items are returned to the user after maintenance is performed at this level.
3. Below depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "H" appearing in the third position of the SMR code. An "H" appearing in the fourth position of the SMR code indicates complete repair is possible at the below depot sustainment maintenance level. Items are returned to the supply system after maintenance is performed at this level.
4. Depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "D" or "K" appearing in the third position of the SMR code. Depot sustainment maintenance can be performed by either depot personnel or contractor personnel. A "D" or "K" appearing in the fourth position of the SMR code indicates complete repair is possible at the depot sustainment maintenance level. Items are returned to the supply systems after maintenance is performed at this level.

The tools and test equipment requirements table (immediately following the MAC) lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks table (immediately following the tools and test equipment requirements) contains supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

1. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gaugings and evaluation of cannon tubes.
2. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:
 - a. **Unpack.** To remove from packing box for service or when required for the performance of maintenance operations.
 - b. **Repack.** To return item to packing box after service and other maintenance operations.
 - c. **Clean.** To rid the item of contamination.
 - d. **Touch up.** To spot paint scratched or blistered surfaces.
 - e. **Mark.** To restore obliterated identification.
4. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.
6. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
7. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. **Paint (ammunition only).** To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.
9. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
10. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

11. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
12. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation of Columns in the MAC

Column (1) Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

C Crew maintenance

F Maintainer maintenance

Sustainment:

L Specialized Repair Activity (SRA)

H Below depot maintenance

D Depot maintenance

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED**NOTE**

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Explanation of Columns in the Tools and Test Equipment Requirements

Column (1) - Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) - Nomenclature. Name or identification of the tool or test equipment.

Column (4) - National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) - Tool Number. The manufacturer's part number.

Explanation of Columns in the Remarks

Column (1) - Remarks Code. The code recorded in column (6) of the MAC.

Column (2) - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE
STANDARD TWO-LEVEL MAC

Table 1. MAC for 5 kW Generator Sets.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
00	GENERA- TOR SET 5KW (LESS ENGINE)	Inspect	.2					
		Inspect		.5				
		Test		1.0			3, 4, 5, 6	
		Test		1.0			3, 4, 5, 6	
		Service	.3				6	
		Service		.3			6	
		Adjust		.3			6	
		Repair		1.5			6	
		Repair		1.5			6	
01	DC ELECTRI- CAL SYSTEM	Inspect	.1					
		Inspect		.1				
		Test		.2			3, 6	
		Repair		.3			6	
0101	BATTERY CABLES	Inspect	.1					
		Inspect		.1				
		Repair		.2			3, 6	
		Remove/Install		.2			6	
		Install		.2			6	
		Replace		.3			3, 6	
0102	BATTERIES	Inspect	.1					
		Inspect		.1				
		Test		.1			3, 6	
		Service	.1				6	
		Service		.1			6	
		Remove/Install		.2			6	
		Install		.2			6	
		Replace		.2			6	B
0103	SLAVE RECEPTACLE CABLES	Inspect	.1					
		Inspect		.1				
		Repair		.2			3, 6	
		Remove/Install		.2			6	
		Install		.2			6	
		Replace		.3			3, 6	
0104	SLAVE RECEPTACLE	Inspect	.1					
		Inspect		.1				
		Remove/Install		.1			6	
		Install		.1			6	

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Replace		.1			6	B
0105	ALTERNATOR	Inspect Inspect Test Test Repair Remove/Install Install Replace	.1	.1 .5 1.0 1.0 1.0	 1.0 2.0		 3, 6 3, 6 3, 6 6 6 6	 B
02	HOUSING	Inspect Inspect Repair	.2	.3 1.0			 6	
0201	ACCESS DOORS	Inspect Inspect Repair Remove/Install Install Replace	.1	.1 .5 .5 .5 .5			 6 6 6 6	 B
0202	FRONT HOUS- ING SECTION	Inspect Inspect Repair Remove/Install Install Replace	.1	.2 1.0 2.0 2.0 2.0			 6 6 6 6	 B
0203	REAR HOUS- ING SECTION	Inspect Inspect Repair Remove/Install Install Replace	.1	.2 1.0 2.0 2.0 2.0			 6 6 6 6	 B
0204	DECALS AND PLATES	Inspect Inspect Remove/Install Install Replace	.1	.1 .3 .3 .3			 1, 3 1, 3 1, 3	 B
03	CONTROL BOX ASSEM- BLY	Inspect Inspect Test	.1	.1 1.0			 3, 6	

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Test		1.0			3, 6	
		Repair		1.0			6	
		Repair		1.0			6	
		Remove/Install		1.0			6	
		Install		1.0			6	
		Replace		1.0			6	B
0301	CONVE- NIENCE RECEPTACLE	Inspect	.1					
		Inspect		.1				
		Test		.2			3, 6	
		Remove/Install		.5			6	
		Install		.5			6	
		Replace		.5			6	B
0302	GROUND FAULT INTER- RUPTER	Inspect	.1					
		Inspect		.1				
		Test	.1				3	
		Test		.1			3	
		Remove/Install		.5			6	
		Install		.5			6	
		Replace		.5			6	B
0303	MALFUNC- TION INDICA- TOR PANEL	Inspect	.1					
		Inspect		.1				
		Test	.1				3	
		Test		.1			3	
		Remove/Install		.5			6	
		Install		.5			6	
		Replace		.5			6	B
0304	FUSE AND CIRCUIT BREAKER	Inspect	.1					
		Inspect		.1				
		Test		.2			3, 6	
		Remove/Install		.5			6	
		Install		.5			6	
		Replace		.5			6	B
0305	VOLTAGE REGULATOR	Inspect		.1				
		Test		.5			3, 6	
		Remove/Install		.5			6	
		Install		.5			6	
		Replace		.5			6	B
0306	RELAYS AND TRANSDUC- ERS	Inspect		.1				
		Test		.3			3, 6	

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Remove/Install		.4			6	
		Install		.4			6	
		Replace		.4			6	B
0307	RESIS- TOR-DIODE ASSEMBLY	Inspect	.1					
		Inspect		.1				
		Test		.5			3, 6	
		Repair		1.0			6	B
		Remove/Install		1.0			6	
		Install		1.0			6	
		Replace		1.0			3, 6	
0308	CONTROL BOX HAR- NESS	Inspect	.1					
		Inspect		.2				
		Test		1.0			3, 6	
		Test		1.0			3, 6	
		Repair		1.0			3, 6	
		Repair		1.0			3, 6	
		Remove/Install		1.5			6	
		Install		1.5			6	
		Replace		1.5			6	B
0309	PANEL LIGHTS	Inspect	.1					
		Inspect		.1				
		Remove/Install		.3			6	
		Install		.3			6	
		Replace		.3			6	B
		Repair		.2				C
0310	INDICATORS	Inspect	.1					
		Inspect		.1				
		Test		.3			3, 6	
		Remove/Install		.2			6	
		Install		.2			6	
		Replace		.2			6	B
0311	SWITCHES	Inspect	.1					
		Inspect		.1				
		Test		.2			3, 6	
		Remove/Install		.2			6	
		Install		.2			6	
		Replace		.2			6	B
0312	CONTROL BOX PANELS	Inspect	.1					
		Inspect		.1				

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Repair Remove/Install Install Replace		.2 2.0 2.0 2.0			6 6 6 6	B
0315	DECALS AND PLATES	Inspect Inspect Remove/Install Install Replace	.1	.1 .3 .3 .3			1, 3 1, 3 1, 3	B
04	OUTPUT BOX ASSEMBLY	Inspect Inspect Test Test Repair Repair Remove/Install Install Replace		.2 .2 .5 .5 1.0 1.0 2.0 2.0 2.0			3, 5, 6 3, 5, 6 6 6 6 6 6	B
0401	OUTPUT BOX HARNESS	Inspect Inspect Inspect Test Repair Repair Remove/Install Install Replace	.1	.2 .2 .6 1.0 1.0 2.0 2.0 2.0			3, 5, 6 6 6 6 6 6	B
0402	AC CIR- CUIT INTER- RUPTER	Inspect Test Remove/Install Install Replace		.2 .5 .5 .5 .5			3, 6 6 6 6	B
0403	RELAYS	Inspect Test Remove/Install Install Replace		.2 .5 .5 .5 .5			3, 6 6 6 6	B
0404	RECONNEC- TION SWITCH	Inspect Test		.2 .5			3, 6	

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Remove/Install Install Replace		.7 .7 .7			6 6 6	B
0405	OUTPUT BOX PANELS	Inspect Inspect Repair Remove/Install Install Replace	.1	.1 .2 2.0 2.0 2.0			6 6 6 6	B
05	AIR INTAKE/ EXHAUST SYSTEM	Inspect Inspect Repair	.2	.2 .8			6	
0501	MUFFLER AND PIPES	Inspect Inspect Remove/Install Install Replace	.1	.2 .5 .5 .5			6 6 6	B
0502	AIR CLEANER ASSEMBLY	Inspect Inspect Service Service Repair Remove/Install Install Replace	.2 .2	.2 .2 .5 .5 .5 .5			6 6 6 6	B
06	COOLANT SYSTEM	Inspect Inspect Test Test Service Repair	.1 .1	.1 .5 1.0 .1			6 6 6 3	
0601	RADIATOR	Inspect Inspect Repair Repair Remove/Install Install Replace	.1	.2 .5 1.0 1.0 1.0	2.0		4, 6 4, 6 6 6 6	B

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
0602	COOLANT HOSES	Inspect Inspect Remove/Install Install Replace	.1	.1 .5 .5 .5			6 6 6	B
0603	COOLANT RECOVERY SYSTEM	Inspect Inspect Remove/Install Install Replace	.1	.1 .5 .5 .5			6 6 6	B
0604	COOLING FAN	Inspect Inspect Remove/Install Install Replace	.1	.1 .8 .8 .8			6 6 6	B
0605	FAN BELT	Inspect Inspect Adjust Remove/Install Install Replace	.1	.1 .5 .5 .5 .5			2, 6 6 6 6	B
07	FUEL SYSTEM	Inspect Inspect Repair	.1	.2 1.0			6	
0701	FUEL TANK FLOATS AND SWITCHES	Inspect Test Remove/Install Install Replace		.2 .3 .5 .5 .5			3, 6 6 6 6	B
0702	LOW PRES- SURE FUEL LINES	Inspect Inspect Remove/Install Install Replace	.1	.2 .4 .4 .4			6 6 6	B
0703	FUEL TANK	Inspect Inspect Service Service	.1 .3 .1 .3	.2 .2				

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Remove/Install Install Replace		1.5 1.5 1.5			6 6 6	B
0704	AUXILIARY FUEL PUMP	Inspect Inspect Test Remove/Install Install Replace	.1	.1 .5 .5 .5 .5			3 6 6 3, 6	
0705	FUEL TRANS- FER PUMP	Inspect Inspect Test Remove/Install Install Replace	.1	.1 .3 .5 .5 .5			3 6 6 3, 6	
0706	FUEL FIL- TER/WATER SEPARATOR	Inspect Inspect Service Service Repair Remove/Install Install Replace	.1 .1	.2 .4 .3 1.0 1.0 1.0			6 6 6 6 6 6	B
0707	AUXILIARY FUEL FILTER	Inspect Remove/Install Install Replace	.1	.2 .2 .2			6 6 6	B
08	LUBRICATION SYSTEM	Inspect Inspect Service Service Repair	.1 .2 .1 .2	.2 .2 .5			6	A A A A A
0801	OIL DRAIN ASSEMBLY	Inspect Inspect Repair Remove/Install Install Replace	.1	.2 .5 .5 .5 .5			6 6 6 6	B

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
09	ENGINE ACCES- SORIES	Inspect Inspect Repair	.1	.1 .5				
0901	FREQUENCY ADJUST CABLE	Inspect Inspect Adjust Remove/Install Install Replace	.1	.1 .3 .5 .5			6 6 6 6	B
0902	SENDERS AND SWITCHES	Inspect Inspect Test Remove/Install Install Replace	.1	.1 .5 .5 .5 .5			3, 6 6 6 6	B
0903	FUEL SOLENOID ASSEMBLY	Inspect Inspect Test Repair Remove/Install Install Replace	.1	.1 .3 .3 .5 .5 .5			6 6 6 6 3, 6	
0904	DEAD CRANK SWITCH	Inspect Inspect Test Remove/Install Install Replace	.1	.1 .5 .5 .5 .5			3 6 6 6	B
0905	DECALS AND PLATES	Inspect Inspect Remove/Install Install Replace	.1	.1 .3 .3 .3			1, 3 1, 3 1, 3	B
10	SKID BASE	Inspect Inspect Repair Remove/Install Install Replace	.1	.1 1.0 1.0 1.0 1.0			6 6 6 6	B

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
11	OUTPUT LOAD TERMI- NAL BOARD ASSEMBLY	Inspect Inspect Test Repair Remove/Install Install	.1	.1 .5 1.0 1.5 1.5			3 6 6 6	
1101	LOAD TERMI- NALS	Inspect Inspect Remove/Install Install Replace	.1	.1 .5 .5 .5			6 6 6	B
1102	VARISTORS	Inspect Test Remove/Install Install Replace		.1 .5 1.0 1.0 1.0			3 6 6 6	B
1103	LOAD TERMI- NAL BOARD	Inspect Inspect Remove/Install Install Replace	.1	.1 1.5 1.5 1.5			6 6 6	B
12	GENERATOR ASSEMBLY	Inspect Test Repair Remove/Install Install Replace		.3 4.0 4.0 4.0 4.0 4.0			3, 5, 6 6 6 6 6	B
1201	ENDBELL ASSEMBLY	Inspect Remove/Install Install Replace		.2 .3 .3 .5			6 6 6	B
120101	STATOR CORE, EXCITER	Inspect Test Repair Remove/Install Install Replace		.2 .5 .3 .5 .5 .5			3, 6 3 6 6 6	B
1202	FLYWHEEL ASSEMBLY	Inspect		.2				

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Remove/Install Install Replace Repair		.3 .3 .3 1.0			6 6 6 6	B
1203	ROTOR ASSEMBLY	Inspect Test Repair Remove/Install Install Replace		.2 .5 1.0 .5 .5 .5			3, 5, 6 3, 5, 6 6 6 6	B
120301	ROTOR CORE, EXCITER	Inspect Test Repair Remove/Install Install Replace		.2 .3 .3 .5 .5 .5			3, 5, 6 3, 6 3, 6 3, 6 3, 6	B
120302	ROTOR ASSEMBLY, MAIN	Inspect Test Repair Remove/Install Install		.2 .3 .3 .5 .5			3, 6 3, 6 3, 6 3, 6	
1204	FRAME AND STATOR ASSEMBLY	Inspect Test Repair Remove/Install Install Replace		.2 .3 .3 .5 .5 .5			3, 5, 6 6 6 6 6	B
13	ENGINE ASSEMBLY	Inspect Inspect Test Service Service Adjust Repair Repair Repair Remove/Install Install Replace	.2 .3 1.0	.5 1.5 .5 1.0 2.0 2.0 4.0 4.0 8.0			 3, 6 3, 6 3, 6	A A A A A A A A

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
14	WINTERIZA- TION KIT	Test		0.5			1, 6, 5	A
		Remove/Install		2.0			6, 5	
		Repair		2.0			6, 5	B
		Replace		1.0			6, 4, 5	D
		Install		4.0			6, 4, 5	
1401	CONTROL UNIT	Test		0.5			1, 6, 5	A
		Remove/Install		0.5			6, 5	
		Replace		0.5			6, 5	D
		Install		0.5			6, 5	
1402	OPERATION AND FUNC- TION CODE PLATES	Inspect	0.1					E
		Inspect		0.1				E
		Replace		0.5				
140201	FUNCTION CODE PLATE	Inspect Replace	0.1	0.5			6, 4, 5	E
14020101	INDICATOR LIGHT	Remove/Install		0.2			6, 5	
		Replace		0.3			6, 5	D
		Install		0.2			6, 5	
140202	OPERATING PLATE	Inspect		0.1				E
		Replace		0.5			6, 4, 5	D
140203	HEATER SWITCH	Inspect	0.1					E
		Inspect		0.1				E
		Test		0.3			1	A
		Remove/Install		0.5			6, 5	
		Replace		0.5			6, 5	D
		Install		0.5			6, 5	
1403	FUEL SYSTEM AND ATTACH- MENTS	Install Install	0.1	0.1				
140301	FUEL PUMP	Test		0.3			1, 6	A
		Remove/Install		0.5			6, 5	
		Replace		0.5			6, 5	D
		Install		0.5			6, 5	
140302	FUEL LINE	Inspect		0.1			6, 5	E
		Remove/Install		0.2			6, 5	
		Replace		0.4			6, 5	D
		Install		0.2			6, 5	
1404	HEATER ASSEMBLY	Inspect	0.1					E

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Inspect Test Remove/Install Repair Replace Install		0.1 0.5 0.5 0.5 0.5 0.5			1, 6, 5 6, 5 6, 5 6, 5 6, 5	E A C D
140401	COOLANT PUMP	Test Remove/Install Replace Install		0.5 0.5 0.5 0.5			1, 6, 5 6, 5 6, 5 6, 5	A D
140402	RESISTOR	Test Replace		0.3 0.5			1, 6 6, 5	A D
140403	IGNI- TOR/GLOW PLUG	Test Replace		0.3 0.5			1, 6 6, 5	A D
1405	HEATER ASSEMBLY ATTACH- MENTS	Replace		1.0			6, 5	D
1406	COOLANT HOSES AND ATTACH- MENTS	Inspect Inspect Remove/Install Replace Install	0.1	0.1 0.5 0.5 0.5			6, 5 6, 5 6, 5	E E D
1407	AIR INLET/ EXHAUST HOSES	Inspect Inspect Remove/Install Replace Install	0.1	0.1 0.5 0.5 0.5			6 6, 5 6, 5	E E D
1408	WIRING HAR- NESS	Inspect Inspect Test Remove/Install Repair Replace Install	0.1	0.1 0.8 0.5 1.0 1.0 0.4			1, 6, 5 6, 5 6, 5 6, 5 6	E E A B D
1409	BREATHER TUBE HEATER ASSEMBLY	Inspect Test Remove/Install Replace		0.3 1.0 0.25 0.5			1, 6 6 6	E A D

Table 1. MAC for 5 kW Generator Sets. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
		Install		0.25			6	
140901	ROPE HEATER	Inspect		0.2				E
		Test		0.5			1, 6	A
		Replace		0.5			6	D
140902	THERMOSTAT ASSEMBLY	Inspect		0.1				E
		Test		0.3			1, 6	A
		Replace		0.3			6	D

Table 2. Tools and Test Equipment Requirements for 5 kW Generator Sets.

TOOLS OR TEST EQUIPMENT	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	F	POP RIVET GUN	5120-00-508-1588	GGG-R-00395
2	F	SCALE, DIAL	6670-00-254-4634	AAA-S-133
3	F	SHOP EQUIPMENT, AUTO- MOTIVE MAINT AND REPAIR	4910-00-754-0654	SC4910-95- CL-A74
4	F	SHOP EQUIPMENT, AUTO- MOTIVE MAINT AND REPAIR, FIELD	4910-00-348-7696	SC4910-95- CL-A02
5	F	SHOP EQUIPMENT, ELEC- TRICAL REPAIR	4910-01-096-4475	SC4940-95- CL-B05
6	F	TOOL KIT, GENERAL MECHANIC	5180-00-177-7033	SC5180-90- CL-N26

Table 3. Remarks for 5 kW Generator Sets.

REMARK CODE	REMARKS
A	Refer to TM 9-2815-252-24.
B	Replace function identical to removal/install function.
C	Repair is limited to replacement of bulb.
D	Empty
E	Empty

END OF WORK PACKAGE

FIELD AND SUSTAINMENT MAINTENANCE

EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION

Scope

This work package lists expendable and durable items that you will need to operate and maintain the (enter equipment/end item name). This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use brake fluid (WP 0131, item 5)).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item.

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	F	8040-00-843-0802	Adhesive, RTV108	OZ
2	F	8040-00-380-7959	Adhesive, Seal, EC847	QT
6	F	8030-01-234-2792	Anti-seize, Compound, CP8, 1/2 lb Can	OZ
3	F	6850-00-664-1403	Antifreeze, A-A-52624, 1 Gal. Can	GL
4	F	6650-01-441-3221	Antifreeze, A-A-52624, 5 Gal. Can	GL
5	F	6850-01-441-3223	Antifreeze, A-A-52624, 55 Gal. Drum	GL
7	F	7920-01-338-3329	Cloth, Cleaning, TX-1250	EA
8	F	8030-00-056-8673	Compound, Thermo, PENETROX A	OZ
9	F	9150-00-663-1770	Grease, General Purpose, 630AA, 6 lb. Can	LB
10	F	9150-00-053-0101	Grease, Molybdenum Disulfide, Molykote 2	OZ

Table 1. Expendable and Durable Items List. – Continued

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
11	F	6850-01-160-3868	Inhibitor, Corrosion, MIL-A-53009A(1)	QT
12	F	9150-00-186-6681	Lubricating Oil, Engine, ALIEDC030, 30W	QT
13	F	9150-01-152-4117	Lubricating Oil, Engine, MIL-PRF-2104H, 15/40W	QT
14	F	9150-00-402-2372	Lubricating Oil, Engine, MIL-PRF-46167D, OEA	QT
15	F	9150-00-189-6727	Lubrication Oil, Engine, BRAYC0421C, 10W	QT
16	F	5350-00-543-3600	Paper, Abrasive, ALOXGRIT80	SH
17	F	8030-00-849-0071	Sealing Compound, FORM-A-GASKET 2	TU
18	F	8030-00-118-0012	Sealing Compound, MIL-S-22473, Grade HVV	OZ
19	F	3439-00-974-1873	Solder, Tin Alloy, SN60WRAP2, 1 lb. Spool	OZ
20	F	6850-00-264-9038	Solvent, Dry Cleaning, P-D-680, 5 Gal. Can	GL

END OF WORK PACKAGE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA					Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).		DATE 21 Nov 2011
TO: (Forward to proponent of publication or form) (Include ZIP Code) Commander, U.S. Army Communications-Electronics Command, 6001 Combat Drive, ATTN: AMSEL-LCL-ECM, Aberdeen Proving Ground, MD 21005-1846					FROM: (Activity and location) (Include ZIP Code) Jane Q. Doe, SFC 1234 Any Street Anytown, AL 34565		
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 11-1234-567-14				DATE 15 Jan 2011		TITLE Operator, Field and Sustainment Support Maintenance Manual for Radio, AN/ABC-123	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
1	WP0005 PG 3		2			Test or Corrective Action should identify a different WP number.	
TYPED NAME, GRADE OR TITLE Jane Q. Doe, SFC				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 123-4567		SIGNATURE	

TO: (Forward to proponent of publication or form) (Include ZIP Code)				FROM: (Activity and location) (Include ZIP Code)			DATE	
PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS								
PUBLICATION/FORM NUMBER				DATE		TITLE		
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
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PUBLICATION/FORM NUMBER				DATE		TITLE	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
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PUBLICATION/FORM NUMBER			DATE		TITLE			
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
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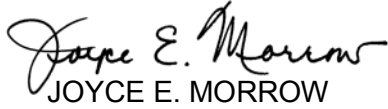
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PUBLICATION/FORM NUMBER				DATE		TITLE	
ITEM	PAGE	PARA- GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

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PUBLICATION/FORM NUMBER			DATE		TITLE			
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
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| A1 | ACUATOR PRESSURE | D53 | PAIR FIGHT LIGHT | K42 | OVERCHARGE RELAY | A05 | FUEL LEVEL INCREASE | P14 | FIELD FLAME RESISTOR |
| A2 | WATERING LINE PRESSURE | D54 | PAIR FIGHT LIGHT | K43 | OVERCHARGE RELAY | A06 | FUEL LEVEL DECREASE | P15 | FIELD FLAME RESISTOR |
| A3 | RESISTOR (FUEL) | D55 | PAIR FIGHT LIGHT | K44 | OVERCHARGE RELAY | A07 | FUEL PRESSURE INCREASE | P16 | FIELD FLAME RESISTOR |
| A4 | RESISTOR (FUEL) | D56 | PAIR FIGHT LIGHT | K45 | OVERCHARGE RELAY | A08 | FUEL PRESSURE DECREASE | P17 | FIELD FLAME RESISTOR |
| A5 | RESISTOR (FUEL) | D57 | PAIR FIGHT LIGHT | K46 | OVERCHARGE RELAY | A09 | FUEL PRESSURE INCREASE | P18 | FIELD FLAME RESISTOR |
| A6 | RESISTOR (FUEL) | D58 | PAIR FIGHT LIGHT | K47 | OVERCHARGE RELAY | A10 | FUEL PRESSURE DECREASE | P19 | FIELD FLAME RESISTOR |
| A7 | RESISTOR (FUEL) | D59 | PAIR FIGHT LIGHT | K48 | OVERCHARGE RELAY | A11 | FUEL PRESSURE INCREASE | P20 | FIELD FLAME RESISTOR |
| A8 | RESISTOR (FUEL) | D60 | PAIR FIGHT LIGHT | K49 | OVERCHARGE RELAY | A12 | FUEL PRESSURE DECREASE | P21 | FIELD FLAME RESISTOR |
| A9 | RESISTOR (FUEL) | D61 | PAIR FIGHT LIGHT | K50 | OVERCHARGE RELAY | A13 | FUEL PRESSURE INCREASE | P22 | FIELD FLAME RESISTOR |
| A10 | RESISTOR (FUEL) | D62 | PAIR FIGHT LIGHT | K51 | OVERCHARGE RELAY | A14 | FUEL PRESSURE DECREASE | P23 | FIELD FLAME RESISTOR |
| A11 | RESISTOR (FUEL) | D63 | PAIR FIGHT LIGHT | K52 | OVERCHARGE RELAY | A15 | FUEL PRESSURE INCREASE | P24 | FIELD FLAME RESISTOR |
| A12 | RESISTOR (FUEL) | D64 | PAIR FIGHT LIGHT | K53 | OVERCHARGE RELAY | A16 | FUEL PRESSURE DECREASE | P25 | FIELD FLAME RESISTOR |
| A13 | RESISTOR (FUEL) | D65 | PAIR FIGHT LIGHT | K54 | OVERCHARGE RELAY | A17 | FUEL PRESSURE INCREASE | P26 | FIELD FLAME RESISTOR |
| A14 | RESISTOR (FUEL) | D66 | PAIR FIGHT LIGHT | K55 | OVERCHARGE RELAY | A18 | FUEL PRESSURE DECREASE | P27 | FIELD FLAME RESISTOR |
| A15 | RESISTOR (FUEL) | D67 | PAIR FIGHT LIGHT | K56 | OVERCHARGE RELAY | A19 | FUEL PRESSURE INCREASE | P28 | FIELD FLAME RESISTOR |
| A16 | RESISTOR (FUEL) | D68 | PAIR FIGHT LIGHT | K57 | OVERCHARGE RELAY | A20 | FUEL PRESSURE DECREASE | P29 | FIELD FLAME RESISTOR |
| A17 | RESISTOR (FUEL) | D69 | PAIR FIGHT LIGHT | K58 | OVERCHARGE RELAY | A21 | FUEL PRESSURE INCREASE | P30 | FIELD FLAME RESISTOR |
| A18 | RESISTOR (FUEL) | D70 | PAIR FIGHT LIGHT | K59 | OVERCHARGE RELAY | A22 | FUEL PRESSURE DECREASE | P31 | FIELD FLAME RESISTOR |
| A19 | RESISTOR (FUEL) | D71 | PAIR FIGHT LIGHT | K60 | OVERCHARGE RELAY | A23 | FUEL PRESSURE INCREASE | P32 | FIELD FLAME RESISTOR |
| A20 | RESISTOR (FUEL) | D72 | PAIR FIGHT LIGHT | K61 | OVERCHARGE RELAY | A24 | FUEL PRESSURE DECREASE | P33 | FIELD FLAME RESISTOR |
| A21 | RESISTOR (FUEL) | D73 | PAIR FIGHT LIGHT | K62 | OVERCHARGE RELAY | A25 | FUEL PRESSURE INCREASE | P34 | FIELD FLAME RESISTOR |
| A22 | RESISTOR (FUEL) | D74 | PAIR FIGHT LIGHT | K63 | OVERCHARGE RELAY | A26 | FUEL PRESSURE DECREASE | P35 | FIELD FLAME RESISTOR |
| A23 | RESISTOR (FUEL) | D75 | PAIR FIGHT LIGHT | K64 | OVERCHARGE RELAY | A27 | FUEL PRESSURE INCREASE | P36 | FIELD FLAME RESISTOR |
| A24 | RESISTOR (FUEL) | D76 | PAIR FIGHT LIGHT | K65 | OVERCHARGE RELAY | A28 | FUEL PRESSURE DECREASE | P37 | FIELD FLAME RESISTOR |
| A25 | RESISTOR (FUEL) | D77 | PAIR FIGHT LIGHT | K66 | OVERCHARGE RELAY | A29 | FUEL PRESSURE INCREASE | P38 | FIELD FLAME RESISTOR |
| A26 | RESISTOR (FUEL) | D78 | PAIR FIGHT LIGHT | K67 | OVERCHARGE RELAY | A30 | FUEL PRESSURE DECREASE | P39 | FIELD FLAME RESISTOR |
| A27 | RESISTOR (FUEL) | D79 | PAIR FIGHT LIGHT | K68 | OVERCHARGE RELAY | A31 | FUEL PRESSURE INCREASE | P40 | FIELD FLAME RESISTOR |
| A28 | RESISTOR (FUEL) | D80 | PAIR FIGHT LIGHT | K69 | OVERCHARGE RELAY | A32 | FUEL PRESSURE DECREASE | P41 | FIELD FLAME RESISTOR |
| A29 | RESISTOR (FUEL) | D81 | PAIR FIGHT LIGHT | K70 | OVERCHARGE RELAY | A33 | FUEL PRESSURE INCREASE | P42 | FIELD FLAME RESISTOR |
| A30 | RESISTOR (FUEL) | D82 | PAIR FIGHT LIGHT | K71 | OVERCHARGE RELAY | A34 | FUEL PRESSURE DECREASE | P43 | FIELD FLAME RESISTOR |
| A31 | RESISTOR (FUEL) | D83 | PAIR FIGHT LIGHT | K72 | OVERCHARGE RELAY | A35 | FUEL PRESSURE INCREASE | P44 | FIELD FLAME RESISTOR |
| A32 | RESISTOR (FUEL) | D84 | PAIR FIGHT LIGHT | K73 | OVERCHARGE RELAY | A36 | FUEL PRESSURE DECREASE | P45 | FIELD FLAME RESISTOR |
| A33 | RESISTOR (FUEL) | D85 | PAIR FIGHT LIGHT | K74 | OVERCHARGE RELAY | A37 | FUEL PRESSURE INCREASE | P46 | FIELD FLAME RESISTOR |
| A34 | RESISTOR (FUEL) | D86 | PAIR FIGHT LIGHT | K75 | OVERCHARGE RELAY | A38 | FUEL PRESSURE DECREASE | P47 | FIELD FLAME RESISTOR |
| A35 | RESISTOR (FUEL) | D87 | PAIR FIGHT LIGHT | K76 | OVERCHARGE RELAY | A39 | FUEL PRESSURE INCREASE | P48 | FIELD FLAME RESISTOR |
| A36 | RESISTOR (FUEL) | D88 | PAIR FIGHT LIGHT | K77 | OVERCHARGE RELAY | A40 | FUEL PRESSURE DECREASE | P49 | FIELD FLAME RESISTOR |
| A37 | RESISTOR (FUEL) | D89 | PAIR FIGHT LIGHT | K78 | OVERCHARGE RELAY | A41 | FUEL PRESSURE INCREASE | P50 | FIELD FLAME RESISTOR |
| A38 | RESISTOR (FUEL) | D90 | PAIR FIGHT LIGHT | K79 | OVERCHARGE RELAY | A42 | FUEL PRESSURE DECREASE | P51 | FIELD FLAME RESISTOR |
| A39 | RESISTOR (FUEL) | D91 | PAIR FIGHT LIGHT | K80 | OVERCHARGE RELAY | A43 | FUEL PRESSURE INCREASE | P52 | FIELD FLAME RESISTOR |
| A40 | RESISTOR (FUEL) | D92 | PAIR FIGHT LIGHT | K81 | OVERCHARGE RELAY | A44 | FUEL PRESSURE DECREASE | P53 | FIELD FLAME RESISTOR |
| A41 | RESISTOR (FUEL) | D93 | PAIR FIGHT LIGHT | K82 | OVERCHARGE RELAY | A45 | FUEL PRESSURE INCREASE | P54 | FIELD FLAME RESISTOR |
| A42 | RESISTOR (FUEL) | D94 | PAIR FIGHT LIGHT | K83 | OVERCHARGE RELAY | A46 | FUEL PRESSURE DECREASE | P55 | FIELD FLAME RESISTOR |
| A43 | RESISTOR (FUEL) | D95 | PAIR FIGHT LIGHT | K84 | OVERCHARGE RELAY | A47 | FUEL PRESSURE INCREASE | P56 | FIELD FLAME RESISTOR |
| A44 | RESISTOR (FUEL) | D96 | PAIR FIGHT LIGHT | K85 | OVERCHARGE RELAY | A48 | FUEL PRESSURE DECREASE | P57 | FIELD FLAME RESISTOR |
| A45 | | | | | | | | | |

